A THOUGHT PROVOKING NONTECHNICAL BOOK

Science, Nonscience and the Paranormal

Chief Editor

Dr. H. Narasimhaiah

(Former Vice-Chancellor, Bangalore University
and Founder President, The Bangalore Science Forum)

Published by

The Bangalore Science Forum

The National College Buildings,
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(A collection of articles from *the Skeptical Inquirer,* U.S.A., and from the writings of Indian scientists and thinkers)

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PREFACE

The Bangalore Science Forum has completed twenty five years of its useful existence. To commemorate this important milestone, it was decided to bring forth a book consisting of articles published in various issues of *the Skeptical Inquirer* and also articles written by Indian scientists and thinkers. *the Skeptical Inquirer* is the official quarterly of the Committee for the Scientific Investigation of Claims of the Paranormal (CSICOP) which was constituted in 1976 in U.S.A. to encourage the critical investigation of paranormal and fringe science claims.One of the prime objectives of the Bangalore Science Forum is the propagation of scientific temper. The publication of *Science, Nonscience and the Paranormal* is in tune with this objective. Incidentally, the articles in this book are also in keeping with one of the most important Fundamental Duties of Citizens enshrined in the Constitution of India, namely, "It shall be the duty of every citizen of India to develop scientific temper, humanism and the spirit of inquiry and reform."

Propagation of scientific temper and stressing the supremacy of reason are very important, specially in our country, which is being plagued with a number of problems arising out of irrationality. In fact, the Fundamental Duty of Citizens, mentioned earlier, should form the corner-stone and the guiding principle for the formulation of any curriculum.

It is a matter of gratification that eminent scientists and persons imbued with a deep concern and commitment to society, particularly in the U.S.A., have been investigating alleged supernatural phenomena, as members of the (CSICOP). More details about the CSICOP, *the Skeptical Inquirer* and the need for our scientists to take keen interest in investigating all such claims are found in the article "Social Commitment of Scientists" included in this book.

The Bangalore Science Forum conveys its grateful thanks to Prof. Paul Kurtz, Chairman, CSICOP for permitting the publication of the articles from the *the Skeptical Inquirer*. The Forum is very thankful to Mr. Kendrick Frazier, the editor and Mr. Mark Plummer, the Executive Director. Thanks are also due to the other authors for their permission. We are specially grateful to our energetic Secretary of the Bangalore Science Forum, Dr. A. H. Rama Rao, for his valuable help

in taking up the entire responsibility of the publication of this book.

We heartfully acknowledge the contribution of Mr. M. G. Vedavyas, for his help during all stages of the publication of this book. We appreciate the services of Mrs. Pushpa Vedavyas of Science Associates in the marketing of this publication.

Our special thanks are due to M/s. Fotoset Company Limited and M/s. Sudhindra Offset Process, who are largely responsible for the elegant get up and the neat printing of this book.

It is fervently hoped that a study of this book will contribute to a rational approach towards understanding and solving the problems of life and society.

Bangalore
September 17, 1987 — EDITORIAL BOARD

EDITORIAL BOARD

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ABOUT THE CHIEF EDITOR

Dr. H. Narasimhaiah, after passing the B.Sc. (Hons.) and M.Sc. degree examinations in Physics from the Central College, Bangalore, joined the National College, Bangalore as a lecturer in Physics. He received the Ph.D. degree in Nuclear Physics from the Ohio State University, Columbus, USA in 1960. He was Professor of Physics and the Principal of the National College. He was a Visiting Professor at the Southern Illinois University, Carbondale, USA. He was also the Vice-Chancellor of the Bangalore University during 1972-77.

HN—as he is popularly known, is a recipient of the Karnataka State Award and the National Award *Padmabhushana* for his services in the field of education and other fields. The Government of India has honoured him with the award *Tamrapatra* for his active participation in the Indian Freedom Struggle. He is the founder President of the Bangalore Science Forum. He has been a promoter of scientific temper and the method of science and a relentless fighter against obscurantism and superstition for over three decades. He is also the President of the National Educational Society of Karnataka, a respected premier educational organisation which is running a number of schools and colleges. He is now 68.

THE BANGALORE SCIENCE FORUM

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THE BANGALORE SCIENCE FORUM

Report

In response to an appeal issued by Dr. H. Narasimhaiah, then Principal, National College, Basavanagudi, Bangalore-4 suggesting the formation of a science association catering to the needs of the science-loving people of Bangalore in general and the south of Bangalore in particular, a representative gathering of 44 members from various educational institutions including the Indian Institute of Science, the National Aeronautical Laboratory and a few industrial organisations, met in the National College on Sunday the 11th November 1962 at 6 P.M.

Dr. H. Narasimhaiah, while explaining the purpose of the meeting told them the necessity to have a science association to popularise science and to create a scientific outlook among students and the public. The Science Associations in Colleges cannot further these objectives effectively. The period of working of the college science associations is limited to four or five months. Hence he stressed the importance of having an independent science organisation active throughout the year for the benefit of the students and the public. After discussions it was unanimously resolved to name this association as **the Bangalore Science Forum** with the objectives: (1) to popularise science (2) to create a scientific outlook (3) to organise lectures and seminars on science, education and technology (4) to keep those interested in science informed of the latest advances in its different branches.

The Science Forum started its activities slowly and steadily by organising monthly popular talks on science subjects. There used to be three or four film shows in a year. Later there were fortnightly lectures. For the past ten years there have been weekly lectures and monthly film shows.

Annual Inter-Collegiate Speaking Contests on science subjects for the degree and Pre-University students are not only popular but are also educative. Almost all the important science colleges in the city participate. Each student can speak on a science subject of his choice followed by questions and answers. About fifty percent of the participants are awarded prizes classified into "A" and "B" grades. About a hundred students have participated each year in each of the contests.

Another programme of interest to the students is the separate summer schools for Final Year High School students (i.e., the X Standard) and the Pre-University students for one month. This is a kind of informal education in science subjects. Experienced College Lecturers deliver lectures on interesting science subjects for the High School students. In the case of the Pre-University students, very competent scientists mainly from the Indian Institute of Science, Indian Space Organisations and the Raman Research Institute initiate the students into exciting topics in science through their lectures. Every year more than two hundred students benefit from these summer schools.

A novel and a unique science programme of conducting a science festival for one month was launched by the Forum a decade ago. Understandably we had doubts and apprehensions regarding the success of such a one-month festival. Some of us thought that having science programmes for one complete month might be some what boring. Others felt, that if there are music festivals and drama festivals for a fairly long period, why not science festival ? Science could also be a source of pleasure and joy just as any other activity. Finally, it was decided to organise such a festival and it is a matter of satisfaction that all the science festivals have been a remarkable success.

The Bangalore Science Forum is naturally proud of the fact that it has organised more than 900 science lectures and screened nearly 300 film shows on science subjects. Besides, a total of nearly 2000 students have attended the summer schools for X standard students and about 1500 students have attended the summer schools for Pre-University students.

The Bangalore Science Forum places on record its grateful thanks to all the speakers and the members of the staff for their kind co-operation in making these programmes a success. The Forum conveys its very grateful thanks to the National Education Society of Karnataka which has graciously permitted the Forum to house its offices on the premises of the National College and also all the Principals of the National College, Basavanagudi, for their unstinted and warm co-operation extended in organising all these programmes during the course of these 25 years.

The Forum will continue to serve the cause of popularising science and creating a scientific outlook in future also.

Bangalore
September 17, 1987

— A. H. RAMA RAO
Secretary

SOCIAL COMMITMENT OF SCIENTISTS

January 3rd, 1987

An Appeal

The Bangalore Science Forum extends a warm welcome to all the delegates attending the Science Congress and takes this opportunity to make a fervent appeal for their active involvement in opposing all unscientific and irrational claims. As all of us know, our country is steeped in superstititions. One of the greatest miracles of this century is the co-existence of science and superstition. We have modern technology but our thinking continues to be primitive in many ways. Everybody would like to have the fruits of science but the scientific temper is not so popular. Consequently, blind beliefs, fundamentalism and obscurantism have been polluting the society.

One of the fundamental duties of citizens enshrined in the Indian Constitution makes it mandatory on the part of all citizens to develop Scientific temper, Humanism, Spirit of Inquiry and Reform.

As educated persons and more than that as scientists and science teachers, it is our duty to do our best honestly and conscientiously to implement the above Fundamental Duty. It is not enough if we are good and eminent scientists but we should be rational, socially relevant and useful. As we know, an educated superstitious person is more dangerous to the society than his uneducated counterpart. Science has a value and it should not become a mere profession. It should be a mission and a way of life.

We are not suggesting that scientists should take an active interest in all social problems. But they should be true to their conscience and as a matter of duty should express their free and frank opinions on subjects which involve science. For example when astrologers, godmen, yogis and others make claims such as *astrology is scientific, objects can be materialised, gravitation can be defied, prayers can bring rains, etc.,* silence on the part of scientists does great damage to society and scientific attitude. Moreover, such a silence or indifference may amount to supporting such claims indirectly. One important point to note is that persons who make paranormal claims which apparently violate known laws of nature stray from their religious activities and trespass into the domain of science. And the society rightly expects that such trespassers be questioned and dealt with properly by the scientists. Hence, there is a strong justification for the scientists not to ignore such paranormal claims but to investigate them scientifically and announce the findings for the information and the benefit of the public. Otherwise, the public will be cheated by charlatans in different fields in the name of God and religion.

There is a general feeling among the Indian scientists that their involvement in such controversial matters is a waste of time. This is not correct. We wish to draw the attention of our scientists the valuable work that is being done by some eminent persons in the field of science and other fields, particularly in the United States of America. Some of the salient features of a prominent Committee working in this field are given below:

THE COMMITTEE FOR THE SCIENTIFIC INVESTIGATION OF CLAIMS OF THE PARANORMAL

Buffalo, United States of America

The Committee for the Scientific Investigation of Claims of the Paranormal attempts to encourage the critical investigation of paranormal and fringe-science claims from a responsible, scientific point of view and to disseminate factual information about the results of such inquiries to the scientific community and the public. To carry out these objectives, the Committee:

* *Maintains a network of people interested in critically examining claims of the paranormal.*
* *Prepares bibliographies of published materials that carefully examine such claims.*
* *Encouages and commissions research by objective and impartial inquiry in areas where it is needed.*
* *Convenes conferences and meetings.*
* *Publishes articles, monographs, and books that examine claims of the paranormal.*
* *Does not reject claims on a priori grounds, antecedent to inquiry, but rather examines them objectively and carefully.*

The Committee consists of 38 active members with a number of noted scientists (including Nobel Laureates), Psychologists, Philosophers and Magicians. Besides, it has 43 scientific and technical consultants. Some of the prominent persons are:

(1) Murray Gell-Mann, Nobel Laureate, Professor of Physics, California Institute of Technology,
(2) F. H. C. Crick, Nobel Laureate, Biophysicist, Salk Institute for Biological Studies,
(3) B. F. Skinner, Psychologist, Harvard University,
(4) Carl Sagan, Astronomer, Cornell University,
(5) Edwin C. Krupp, Astronomer, Director, Griffith Observatory,
(6) Martin Gardner, Author, Critic,
(7) Isaac Asimov, Bio-chemist, Author,
(8) James Randi, Magician.

Paul Kurtz, Philosopher, State University of New York at Buffalo is the Chairman.

The Committee has constituted a number of Sub-Committees such as Astrology Sub-Committee, Paranormal Health Claims Sub-Committee, Para-Psychology Sub-Committee, UFO Sub-Committee and Education Sub-Committee.

A number of local organisations with similar aims to the main Committee are working in more than 15 States in the United States of America. Besides, there are international committees in a number of countries including Great Britain, Canada and France.

SOUTHERN CALIFORNIA SKEPTICS

The above Association was established in 1984 and is affiliated to the national organisation—The Committee for the Scientific Investigation of Claims of the Paranormal. It has grown quickly in this short period. Its Board of Directors includes Nobel Prize winners, faculty members of the California Institute of Technology, the Universities of California and professional magicians.

The Association's stated aim is to promote the fair and accurate investigation of claims of alleged paranormal occurences and to disseminate the results of these investigations to the public.

It is of interest to note that the findings of the *'Southern California Skeptics'* were published in the *Caltech Journal of Engineering and Science* in 1985 May issue under the title 'Ghostbusters !'. This article deals with the Physics of walking on fire, on claims of getting rains by prayers and a few other paranormal phenomena. Such subjects are considered to be 'Untouchables' and their publication in our Science Journals blasphemous by most of our Indian Scientists.

THE SKEPTICAL INQUIRER

The Skeptical Inquirer is the official quarterly journal of the Committee for the Scientific Investigation of the Claims of Paranormal. The findings of the Committee on various subjects are published in the *The Skeptical Inquirer*. It may be of interest to note that the following are some of the topics on which scientific investigations have been conducted and findings published.

1. Astrology
2. Extra Sensory Perception (ESP),
3. Psychokinesis,
4. Unidentified flying objects (UFOs),
5. Telepathy,

6. The Physics of fire-waling,
7. Pseudoscientific beliefs,
8. Mystery of Alpha consciousness,
9. Near-death experience,
10. Miracles, Myths and Misinformation,
11. On coincidences,
12. Superstition—Old and New,
13. Bermuda Triangle,
14. Moon and the Maternity ward,
15. Levitation,
16. Psi phenomena,
17. Moon myths,
18. Communication with spirits,
19. Palmistry,
20. Creationist pseudoscience,
21. Science and Pseudoscience,
22. Geller phenomena,
23. Kirlian Photography,
24. Folk Remedies and Human Belief-systems.

Address of *the Skeptical Inquirer*

The Skeptical Inquirer, 3151, Bailey Avenue, Post Office Box No. 229, Central Park Station, BUFFALO, New York-14215.

THE FINDINGS OF THE VARIOUS PARANORMAL INVESTIGATION COMMITTEES AND THEIR PROCEEDINGS IN SEVERAL SEMINARS AND CONFERENCES HAVE RECEIVED FAVOURABLE WIDE COVERAGE IN NEWSPAPERS AND OTHER MASS MEDIA.

B. F. Skinner, the internationally known psychologist and Professor, Harvard University, when requested to be the Honorary Chairman of the Committee for the Scientific Investigation of Claims of the Paranormal Tenth Anniversary Fund notes that he is extremely busy with research and writing and seldom takes on additional projects, but he feels the work OF THE ABOVE COMMITTEE IS SO IMPORTANT AND UNIQUE THAT HE IS BREAKING HIS GENERAL RULE. THIS SHOULD BE AN EXAMPLE TO OTHER SCIENTISTS.

It will also be appropriate to give below the views of scientists and others on astrology.

OBJECTIONS TO ASTROLOGY

A Statement by 186 Leading Scientists including S. Chandrasekhar and 18 Other Nobel Prize Winners

Scientists in a variety of fields have become concerned about the increased acceptance of astrology in many parts of the world. We, the undersigned—astronomers, astrophysicists and scientists in other fields—wish to caution the public against the unquestioning acceptance of the predictions and advice given privately and publicly by astrologers. Those who wish to believe in astrology should realize that there is no scientific foundation for its tenets.

In ancient times people believed in the predictions and advice of astrologers because astrology was part and parcel of their magical world view. They looked upon celestial objects as abodes or omens of the Gods and, thus, intimately connected with events here on earth; they had no concept of the vast distances from the earth to the planets and stars. Now that these distances can and have been calculated, we can see how infinitesimally small are the gravitational and other effects produced by the distant planets and the far more distant stars. It is simply a mistake to imagine that the forces exerted by stars and planets at the moment of birth can in any way shape our future. Neither is it true that the position of distant heavenly bodies make certain days or periods more favourable to particular kinds of action, or that the sign under which one was born determines one's compatibility or incompatibility with other people.

Why do people believe in astrology? In these uncertain times many long for the comfort of having guidance in making decisions. They would like to believe in destiny predetermined by astral forces beyond their control. However, we must all face the world, and we must realize that our future lies in ourselves, and not in the stars.

One would imagine, in this day of widespread enlightenment and education, that it would be unnecessary to debunk beliefs based on magic and superstition. Yet, acceptance of astrology pervades modern society. We are especially disturbed by the continued uncritical dissemination of astrological charts, forecasts and horoscopes by media and by otherwise reputable newspapers, magazines and book publishers. This can only contribute to the growth of irrationalism and obscurantism. We believe that the time has come to challenge directly and forcefully, the pretentious claims of astrological charlatans.

It should be apparent that those individuals who continue to have faith in astrology do so in spite of the fact that there is no verified scientific basis for their beliefs, and indeed that there is strong evidence to the contrary.

Bart J. Bok, *Emeritus*	Lawrence E. Jerome	Paul Kurtz
Professor of Astronomy	*Science Writer*	*Professor of Philosophy*
University of Arizona	Santa Clara, California	SUNY at Buffalo

19 Nobel Prize Winners

(1) Hans A. Bethe, *Professor Emeritus of Physics,* Cornell
(2) Sir Francis Crick, *Medical Research Council,* Cambridge, England
(3) Sir John Eccles, *Distinguished Professor of Physiology and Biophysics,* SUNY at Buffalo
(4) Gerhard Herzberg, *Distinguished Research Scientist,* National Research Council of Canada,

(5) Wassily Leontief, *Professor of Economics,* Harvard University
(6) Konrad Lorenz, *University Professor,* Austrian Academy of Sciences
(7) Andre M. Lwoff, *Honorary Professor,* Institut Pasteur, Paris
(8) Sir Peter Medawar, *Medical Research Council,* Middlesex University, England
(9) Robert S. Mulliken, *Distinguished Prof. of Chemistry,* University of Chicago
(10) Linus C. Pauling, *Professor of Chemistry,* Stanford University
(11) Edward M. Purcell, *Gerhard Gade University Professor,* Harvard University
(12) Paul A. Samuelson, *Professor of Economics,* MIT
(13) Julian Schwinger, *Professor of Physics,* University of California, Los Angeles
(14) Glenn T. Seaborg, *University Professor,* University of California, Berkely
(15) J. Tinbergen, *Professor Emeritus,* Rotterdom
(16) N. Tinbergen, *Emeritus Professor of Animal Behaviour,* Oxford University
(17) Harold C. Urey, *Professor Emeritus,* University of California, San Diego
(18) George Wald, *Professor of Biology,* Harvard University
(19) S. Chandrasekhar, *Professor,* Chicago University
— and other 167 Leading Scientists.

(Published in *"The Humanist"* in its September/October — 1975 issue, U.S.A.)

ASTROLOGY IS MOST STUPID

"When you collect the ten wisest men of the world and ask them to find the most stupid thing in existence, they will not be able to find anything stupider than astrologer."

— Statement made by David Hilbert,
One of the World's greatest Mathematicians.

CONCLUSION

All the above data conclusively prove the need for the active involvement of scientists in investigating scientifically all paranormal claims.

Scientists in other countries have been doing it. In India the need is greater. We fervently hope that our scientists will rise to the occasion and not lag behind.

It would be meaningful if every University starts a Department for such investigations. Besides, all paranormal claims which violate the known laws of nature should also be discussed at the annual sessions of the Indian

Science Congress and other appropriate science conferences.

It is also important that individual scientists at least question all such claims by writing to newspapers.

RATIONALISM — Supremacy of Reason

Rationalism does not, however, either begin or end with the mere adoption of a critical attitude to established beliefs in religion or philosophy. The Rationalist seeks to overthrow accepted beliefs only in so far as he conceives them to stand in the way of a true constructive explanation of man's relation to the Universe and to his kind. He believes, in short, that right thinking is the key to right conduct, and that, as Mr. J. M. Robertson puts it, you cannot "rationalize conduct without seeking to rationalize creed." Rationalism — the acceptance of the reason as the final arbiter in all matters relating to the formation of opinion — involves the adoption of an essentially positive and affirmitive, though wisely discriminative, attitude towards the materials of experience. Of course, the mere intention to be reasonable does not always succeed in its object. Although we can all reason fairly well up to a certain point, most of us reach that point all too soon. Hence, increasing accuracy and adequacy in the use of our reasoning powers should be our constant aim. And if we are to achieve that aim in any marked degree we must voluntarily undergo certain disciplines in supplement of those afforded by our present defective system of education.

— Thomas Paine in *'The Age of Reason'*

NATURE SLAMS PARASCIENCE

The British journal *Nature* recently published one of the strongest critical reviews on the subject of paranormal claims to appear in a mainline scientific journal in years.

The six-page cover article in the March 13 *Nature* by psychologist (and CSICOP Fellow) David Marks is separate from his earlier, brief report on remote-viewing. Its introductory summary pulls no punches: "Parascience has so far failed to produce a single repeatable finding and, until it does, will continue to be viewed as an incoherent collection of belief systems steeped in fantasy, illusion, and error."

The article recounts the failure of paranormal researchers to produce hard evidence for extrasensory perception and precognition. (It gives references to many critical investigations published in the past ten years). It then considers reasons for the widespread belief in the paranormal despite this. It discusses psychological factors responsible for paranormal beliefs (mental imagery, expectancy, subjective validation, invisible chains of cause and effect that bias probablities away from chance levels, and the desire to believe).

The article is more than a valuable summary for the skeptic. Since *Nature* is one of the world's most widely read and respected scientific journals, it will reach scientists who normally don't see the literature evaluating paranormal claims.

— K. F.

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CREATIVITY AND SKEPTICISM

Scientists are, of course, human. When their passions are excited they may abandon temporarily the ideals of their discipline. But these ideals, the scientific method, have proved enormously effective. Finding out the way the world really works requires a mix of hunches, intuition and brilliant creativity; it also requires skeptical scrutiny of every step. It is the tension between creativity and skepticism that has produced the stunning and unexpected findings of science. In my opinion the claims of borderline science pall in comparison with hundreds of recent activities and discoveries in real science.

— Carl Sagan,
Broca's Brain, Random House, 1979
Vol. IV, No. 1 Fall 1979

THE STRUGGLE

The struggle against the persistent and overwhelming majority of fools and of those who exploit them as tools is indeed a tough one and with little prospects. But the fight is necessary for without it mankind will be in a worse plight.

— ALBERT EINSTEIN — *Message sent by him to West German Congress of Free Thinkers on 2-10-1953*

* *

One is born into a herd of buffaloes and must be glad if one is not trampled underfoot before one's time.

— ALBERT EINSTEIN

* *

Great spirits have always encountered violent opposition from mediocre minds.

— ALBERT EINSTEIN

CONSTITUTION OF INDIA—Part IV A

FUNDAMENTAL DUTIES OF CITIZENS

51A. It shall be the duty of every citizen of India—

(a) to abide by the Constitution and respect its ideals and institutions, the National Flag and the National Anthem;

(b) to cherish and follow the noble ideals which inspired our national struggle for freedom;

(c) **to uphold and protect the sovereignty, unity and integrity of India;**

(d) to defend the country and render national service when called upon to do so;

(e) to promote harmony and the spirit of common brotherhood amongst all the people of India transcending religious, linguistic and regional or sectional diversities; to renounce practices derogatory to the dignity of women;

(f) to value and preserve the rich heritage of our composite culture;

(g) to protect and improve the natural environment including forests, lakes, rivers and wild life, and to have compassin for living creatives;

(h) **to develop the scientific temper, humanism and the spirit of inquiry and reform;**

(i) to safeguard public property and to abjure violence;

(j) **to strive towards excellence in all spheres of individual and collective activity so that the nation constantly rises to higher levels of endeavour and achievement.**

1

A Statement on Scientific Temper

A. Preamble

The history of humanity bears witness to periods of enlightenment as well as to periods of darkness. It bears witness to the rise and fall of civilizations. Through all the vicissitudes of time the knowledge gained by humanity has retained a quality of indestructibility. Viewing the entire panorama of the universal history of mankind, one becomes conscious of a continuous but forward movement towards greater knowledge and to an increasing capacity of human beings to exercise control over their environment.

While humanity as a whole accumulates knowledge, there is no guarantee that the availability of such knowledge will, by itself, enable every country to use it successfully for its own advancement and the well being of its people. There are examples in history where predominant social, political, cultural and value systems inhibited the absorption of knowledge resulting in periods of stagnation, decay and retreat from reason, rationality and science. Though the Renaissance began in Italy, and Galileo, the harbinger of modern science, was an Italian, adherence to obscurantism enforced by the Church led Italy to losing the benefit of the Renaissance which fertilized Northern parts of Europe. The Renaissance and the Reformation then combined together to revolutionize thought as well as society.

In our own country too we have known of periods of creativity when the spirit of enquiry led to the accumulation of scientific knowledge; there was creativity in literature, music, arts and crafts. However, we have also known of periods when the spirit of enquiry got extinguished. During those long stretches of time everything was reduced to unquestioning dogmas and to the performance of dead

rituals. There was deadening of curiosity and questioning. There was only passivity and acceptance. And finally, we were overtaken by the greatest of disasters — our complete colonisation and subjugation to British imperialism.

Contemplating our decline, decay and subjugation, some of our best minds began asking themselves why and how it all happened. This spirit of enquiry and questioning gave birth to a wide social cultural movement which we call the Indian renaissance. The best Indian minds in the pre-independence times insistently propagated the need for the people to think independently and fearlessly, and to question traditional beliefs. This effort, in time, produced a critique of the colonial system. Out of this critique was born a powerful national movement for our liberation. The British imperial system, aligning itself with the vested interests, endeavoured to counter the broad stream of nationalism by encouraging revivalism and obscurantism. And though Indian renaissance never elaborated a critique of our entire ancient society and unfortunately made compromises, the urge to acquire knowledge and the scientific outlook remained strong. The spirit of questioning ultimately overwhelmed an imperial system which seemed so powerful and even immutable.

There is a wide awareness in our times that we are living in a scientific age of great discoveries in science, affecting and moulding both our material and social existence. It is indeed remarkable how a comparatively small number of physical laws seem sufficient to explain a great part of behaviour of matter, right from the huge and massive heavenly objects located at the very edges of outer universe to the minute regions of atoms and atomic nucleus. In life sciences, we are in the midst of far reaching, even revolutionary, changes. The entire history of humanity shows that it is the scientific temper which not only created and promoted science, but also gave humanity the means to affect the natural and social environment. It is, therefore, the scientific temper which is the most precious heritage of humanity. It is the result of incessant human labour, search and struggle.

Jawaharlal Nehru gave an impetus to Scientific Temper by setting before the people the target of catching up with the rest of the world with the help of science and technology. He unfolded the perspective of leap-frogging the centuries. Implicit in such a vision was a vast change in the intellectual climate of our people. Our Constitu-

tion and the subsequent resolution on Science Policy were predicted upon the assumption that our ancient society needed basic changes. However, there was not enough appreciation of the relationship between the objectives to be achieved and the methods as well as the instrumentalities appropriate for bringing about the desired changes. No systematic and sustained effort was made to work out, specifically and concretely, what needed to be done to build a society which is animated by a spirit of enquiry. rather than passivity and acceptance. The result of this lack of directed efforts was accommodation, even compromise, with the forces of obscurantism and with the existing inegalitarian social and economic structures. Failure to give mass dimensions and appropriate institutional forms to Scientific Temper, more specially to our educational system, led to the erosion of confidence in our capacity to mould our destiny.

In such an environment, Scientific Temper is beleaguered and besieged by deep-rooted structures of an ancient society with superimposed colonial structures. Consequently, there has been frustration of our hopes of optimising the results of the application of science and technology for our national reconstruction. Inevitably, such frustration has encouraged a search for and reliance upon authority. Inevitably too, there has been a growth of tendencies to escape into magical beliefs and instant solutions. Even science and technology are being offered not as methods of enquiry or value systems but as magical cures for our ills, reminding one of the time when Roman intellectuals sought refuge in Levantine magic. There is inadequate appreciation of the close inter-action between science and technology and society and of the fact that the benefits of science and technology can reach the people only if the socio-economic conditions are conducive. If the cultural environment, socio-economic conditions and institutional structures inhibit the spirit of enquiry, the desired results can never be achieved.

The gravity of our predicament is increasing day by day. While we rank high among the industrialised countries in the world and are the third largest country in the world in regard to the stock of manpower trained in science and technology, we are close at the bottom of the list in terms of per capita food consumption, longevity, health care and general quality of life. We have all the technology available right now within the country to give water, food, shelter, and basic health care to our millions. And yet we do not. Something

has gone wrong. The logic of planning and the logic of our socio-economic structure are at variance. Hence, our failures and disappointments.

In such an environment, there is an erosion of belief in the capacity of human faculties to solve national problems through a systematic critique of the existing social situation. There is a cancerous growth of superstition at all levels. Rituals of the most bizarre kind are frequently performed often with official patronage. Obscurantist social customs are followed even by those whose profession is the pursuit of scientific enquiry. Our entire educational system works in an atmosphere of conformity, non-questioning and obedience to authority. Quoting authority of one kind or another substitutes enquiry, questioning and thought.

Obscurantism and irrationalism practised by a hierarchy of authorities has the predictable effect of reinforcing retreat from reason. Voices raised against such a state of affair get silenced. The decision-making processes are increasingly being divorced from any rational purpose or design. There is no long-term perspective based on ascertained facts and scientific analysis. Adhocism, whims and the narrowest of considerations take the place of well-planned programmes. Priorities, if any, are fixed without sufficient data-base and without any attempt at scientific evaluation of national needs, potentialities and feasibility of implementation. Mere slogans tend to be used as a substitute for action and for creating an illusion of achievement. Dramatic crash programmes are launched. These, inevitably, crash. There are no perspective plans. Even Five Year Plans have been reduced to annual exercises of allocating funds.

As our country enters the last two decades of the 20th century, the need to move forward is becoming ever more insistent. We either overcome the obstacles or we shall be overcome by unreason and dark reaction. We must understand the meaning as well as the imperatives of Scientific Temper, representing as it does, humanity's assertion of being in charge of its destiny and not a passive victim of malevolence or benevolence of stars. To do so, we need to actively combat beliefs which erode Scientific Temper and undermine its growth. Only then shall we illumine our darkening national horizon and provide our people, once again, with a vision and a method for translating that vision into reality. Such a vision must have a Scientific Temper as its integrating bond.

B. Attributes of Scientific Temper

Spread of Scientific Temper in society is much more than the spread of science or technology. Scientific Temper is neither a collection of knowledge or facts, although it promotes such knowledge; nor is it rationalism although it promotes rational thinking. It is something more. It is an attitude of mind which calls for a particular outlook and pattern of behaviour. It is of universal applicability and has to permeate through our society as the dominant value system powerfully influencing the way we think and approach our problems—political, social, economic, cultural and educational.

Scientific Temper involves the acceptance, amongst others, of the following premises:

(a) that the method of science provides a viable method of acquiring knowledge;

(b) that human problems can be understood and solved in terms of knowledge gained through the application of the method of science;

(c) that the fullest use of the method of science in everyday life and in every aspect of human endeavour from ethics to politics and economics, is essential for ensuring human survival and progress; and

(d) that one should accept knowledge gained through the application of the method of science as the closest approximation to truth at that time, and question what is incompatible with such knowledge; and that one should from time to time re-examine the basic foundation of contemporary knowledge.

The method of science, therefore, constitutes a regenerative process for collecting information and processing the collected information to create meaningful patterns leading to an ordered understanding of nature of man himself, his natural and social environment. In this sense, the method of science encompasses all aspects of communicable human knowledge and cuts across all artificial compartmentalisation like natural science, social science, applied science, etc.

The spirit of inquiry and the acceptance of the right to question and be questioned are fundamental to Scientific Temper. It calls upon one to ask the 'how', the 'what' and the 'why' of an object, event or phenomenon. It further calls upon one to exercise the right to

question, provided of course, the questioning of an existing theory, hypothesis or statement or social situation is done in accordance with the scientific method and is not merely a bare assertion of one's belief. Scientific Temper is therefore, incompatible with the acceptance of authorities of all kinds or of 'high priests' who may not be questioned. It leads to the realisation that events occur as a result of interplay of understandable and describable natural and social forces and not because someone, however great, so ordained them. These forces are often complex and intertwined and have to be analytically disentangled.

Scientific Temper is compatible with observation and insight, reasoning and intuition, systematic work and creative impulse. It gives rise to an attitude of mind which while being conscious of vast areas of ignorance, is nevertheless, optimistic about human ability to gradually unravel the mysteries that surround us. In this process, Scientfic Temper becomes a part of the culture, a philosophy, and a way of life which leads to pursuit of truth without prejudgement.

Scientific Temper implies the recognition that knowledge often progresses by disproving earlier ideas, beliefs, theories and laws. It considers knowledge as open-ended and ever-evolving. It lays emphasis on verifiability and repeatability, wherever possible, and on the fact that scientific theories, laws and facts allow one to make predictions which can be tested. It recognises that answers to many questions that may be asked at any given time, may not be available at that time. It, then demands the courage and humility to say, 'I do not know'.

Scientific Temper calls for recognition of the several major differences between the scientific attitude and the theological and metaphysical attitude specially in respect of dogmas proclaimed in the name of religion. There is in fact, essential incompatibility of all dogmas with science. While science is universal, established religions and religious dogmas are divisive. Consider the divisions which exist between Christian, Islamic, Buddhistic and Hindu denominations. Science, in contrast, transcends divisions and is universal.

Scientific Temper has deep emotional content and has, within it, a sense of beauty. That is why considerations based on beauty and simplicity have been often invoked to choose between alternative theories that are otherwise equally tenable.

Inherent in Scientific Temper is a system of value judgements. The inculcation of Scientific Temper in our society would result in our people becoming rational and objective, thereby generating a climate favouring an egalitarian, democratic, secular and universalist outlook. Consequently, Scientific Temper cannot flourish in a grossly inegalitarian society where 50% of the population lives below the poverty line and almost 70% of our people, especially females, are illiterate. Social justice, widespread education and unrestricted communication are, therefore, pre-requisites for spread of Scientific Temper and for optimising the results of science and technology.

C. Role of Scientific Temper

Having outlined the essential elements of Scientific Temper, let us survey our national scene. Despite Jawaharlal Nehru's advocacy of Scientific Temper, we are witnessing a phenomenal growth of superstitious beliefs and obscurantist practices. The influence of a variety of godmen and miracle makers is increasing alarmingly. The modern tools of propaganda and communication are being used to give an impression that there exist instant and magical solutions for the problems that confront our people.

In an age when man has travelled to the moon and returned safely, astrological predictions based on the movements of planets or the lines of one's palm or the number of alphabets in one's name, are widely believed. Food fads, irrational health practices are on the increase. In a poor country where millions live below the poverty line, vast amounts of wealth is consigned in *havanas* and *yajnas.*

Myths are created about our past. The origin and role of the caste system is explained in a way that would justify it and imply that some castes are inherently superior. The ancient period of our history is interpreted to inculcate chauvanism which is false pride; the medieval period is misinterpreted in a way that would fan communalism; and the struggle of our people for freedom is over-simplified as if it was the handiwork of a few great leaders and the masses of our people did not matter.

While it is important to understand the origin of these unscientific beliefs, the more immediate and pressing problem is to understand the remarkable phenomenon of their persistence and the resulting social consequences.

The sustenance of such beliefs and superstitions must be recognised primarily as a historical and social process. Such beliefs continue, because they have ready relevance to the personal situations of the majority of our people. Vast uncertainties of our daily lives, frustration of hopes and aspirations of millions, denial of any vision which would sustain the spirit drives millions to seek mental equilibrium in faith healing. Thus, when one believes that one's miserable personal situation cannot be improved, acceptance of fatalism becomes natural. Beliefs then rationalise the status quo and breed fatalistic doctrines. In such a situation of social and cultural malaise, a major role of Scientific Temper is to revive confidence and hope and to dispel fatalistic outlook. The campaign to promote Scientific Temper must inculcate values like equality and dignity of all human beings, distributive justice, dignity of labour and social accountability of one's actions. All these are essential for bringing about social, economic and cultural transformation of our country.

The emphasis on the method of science does not imply that science and technology have solutions to all human problems at any given time. Indeed, Scientific Temper warns one against the simplistic view that through the introduction and pursuit of science and technology, most social problems and contradictions will automatically get resolved. The role of reason is to apply scientific knowledge to problems, to grapple with them through the method of scientific inquiry and to work for social transformation inspired by Scientific Temper.

We must equally combat the tendency to treat science and technology as a sort of magic. It should be explained that it is unscientific to believe that if scientific and technological solutions exist to a range of problems, these will be automatically adopted. The nature of social stratification and the power structure in a society prevents the acceptance of such solutions. Technologically, one may be able to grow enough food for everyone, but the pattern of income distribution prevents the benefits of increased food production reaching large segments of the population. When the social structure and stratification prevent the application of rational and scientifically proven solutions, the role of Scientific Temper is to lay bare the anatomy of such social barriers.

If we have to regain our place in the world and are not to be relegated once again to the dustbin of history; if we wish to offer a life of

fulfilment to our destitute millions; indeed, if the light of our civilization is not to be extinguished, we have to undertake, on a priority basis, the task of nurturing Scientific Temper. All of us scientists, technologists, social scientists, educationists, teachers, media men have to join hands and undertake this task. We draw inspiration from the way our people in all walks of life joined hands and struggled against colonial domination of our land and of our minds. We believe, it can be done again if only we have the will. And it must be done without any loss of time. Our nation's survival and its future depends on upholding Scientific Temper. Superstition shall not pass and darken our portals.

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SCIENCE AND SCIENTIFIC SPIRIT

Science does not simply sit down and pray for things to happen, but seeks to find out why things happen. My preferences are all for science and the methods of science, for science has opened up tremendous new vistas which wait to be explained.

Science and the scientific spirit and method are the basis of life today. There lies in science the search for truth on the one hand and the betterment of humanity on the other.

The true scientist is the sage unattached to life and the fruits of action, ever seeking truth where so ever this quest might lead him.

— Pandit Jawaharlal Nehru

2

Darwin and the Triumph of Science

Pandit Jawaharlal Nehru

From the poets let us go to the scientists. The poets, I am afraid, are still considered rather ineffectual beings; but the scientists are the miracle-workers of today, and they have influence and honour. This was not so before the nineteenth century. In the earlier centuries a scientist's life was a risky affair in Europe and sometimes ended at the stake. I have told you of how Giordano Bruno was burnt in Rome by the Church. A few years later, in the seventeenth century, Galileo came very near the stake because he had stated that the earth went round the sun. He escaped being burnt for heresy because he apologized and withdrew his previous statements. In this way the Church in Europe was always coming into conflict with science and trying to suppress new ideas. Organized religion, in Europe or elsewhere, has various dogmas attached to it which its followers are supposed to accept without doubt or questioning. Science has a very different way of looking at things. It takes nothing for granted and has, or ought to have, no dogmas. It seeks to encourage an open mind and tries to reach truth by repeated experiment. This outlook is obviously very different from the religious outlook, and it is not surprising that there was frequent conflict between the two.

Experiments of various kinds have, I suppose, been carried on by different peoples in all ages. In ancient India, it is said that chemistry and surgery were fairly advanced, and this could only have been so after a great deal of experimenting. The old Greeks also experimented to some extent. As for the Chinese, recently I read a most astonishing account, which gave extracts from Chinese writers of 1500 years ago, showing that they knew of the theory of evolution, and of the circulation of the blood through the body, and that Chinese surgeons gave anaesthetics. But we do not know enough

about these times to justify any conclusions. If the ancient civilizations had discovered these methods, why did they forget them later? And why did they not make greater progress? Or was it that they did not attach enough importance to this kind of progress? Many interesting questions arise, but we have no materials to answer them.

The Arabs were very fond of experimenting, and Europe in the Middle Ages followed them. But all their experimentation was not truly scientific. They were always looking for what was called the "Philosophers' Stone", which was supposed to have the virtue of turning common metals into gold. People spent their lives in complicated chemical experiments to find the secret of such transmutation of metals into gold; alchemy this was called. They also searched diligently for an "elixir of life" or *amrit*, which would give immortality. There is no record, outside fairy tales, of any one having ever succeeded in finding this *amrit* or the famous stone. This was really dabbling in some kind of magic in the hope of gaining wealth and power and long life. It had nothing to do with the spirit of science. Science has no concern with magic and sorcery and the like.

The real scientific method, however, developed gradually in Europe, and among the greatest names in the history of science is that of the Englishman, Isaac Newton, who lived from 1642 to 1727. Newton explained the law of gravitation—that is, of how things fall; and with the help of this, and other laws which had been dicovered, he explained the movements of the sun and the planets. Everything, both big and small, seemed to be explained by his theories, and he received great honour.

The spirit of science was gaining on the dogmatic spirit of the Church. It could no longer be put down or its votaries sent to the stake. Many scientists patiently worked and experimented and collected facts and knowledge, especially in England and France, and later in Germany and America. The body of scientific knowledge thus grew. The eighteenth century in Europe, you will remember, was the century when rationalism spread among the educated classes. It was the century of Voltaire and Rousseau and many other able Frenchmen who wrote on all manner of subjects and created a ferment in the minds of the people. The great French Revolution was being hatched in the womb of the century. This rationalistic outlook fitted in with the scientific outlook, and both opposed the dogmatic outlook of the Church.

The nineteenth century, I have told you, was, among other things, the century of science. The Industrial Revolution, the Mechanical Revolution, and the amazing changes in the methods of transport, were all due to science. The numerous factories had changed the methods of production; railways and steamships had suddenly narrowed the world; the electric telegraph was an even greater wonder. Wealth poured into England from her far-flung empire. Old ideas were naturally much shaken by this, and the hold of religion grew less. Factory life, as compared to an agricultural life on the land, made people think more of economic relations than of religious dogmas.

In the middle of the century, in 1859, a book was published in England which brought the conflict between the dogmatic and the scientific outlook to a head. This book was the *Origin of Species,* by Charles Darwin. Darwin is not among the very great scientists; there was nothing very new in what he said. Other geologists and naturalists had been at work before Darwin, and had gathered much material. None the less Darwin's book was epoch-making; it produced a vast impression and helped in changing the social outlook more than any other scientific work. It resulted in a mental earthquake and made Darwin famous.

Darwin had wandered about in South America and the Pacific as a naturalist and had collected an enormous amount of material and data. He used this to show how each species of animals had changed and developed by natural selection. Many people had thought till then that every species or kind of animal, including man, had been separately created by God, and had remained apart and unchangeable since then—that is to say that one species could not become another. Darwin showed, by a mass of actual examples, that species did change from one to another, and that this was the normal method of development. These changes took place by natural selection. A slight variation in a species, if it happened to be profitable to it in any way or helped it to survive others, would gradually lead to a permanent change, as obviously more of this varied species would survive. After a while this varied species would be in the majority and would swamp the others. In this way changes and variations would creep in, one after the other, and after sometime there would be an almost new species produced. So in course of time many new species would arise by this process of survival of the fittest by natu-

ral selection. This would apply to plants and animals, and even man. It is possible, according to this theory, that there might be a common ancestor of all the various plant and animal species we see today.

A few years later Darwin published another book—*The Descent of Man*—in which he applied his theory to man. This idea of evolution and of natural selection is accepted by most people now, though not exactly in the way Darwin and his followers put it forward. Indeed, it is quite a common thing for people to apply this principle of selection artificially to the breeding of animals and the cultivation of plants and fruits and flowers. Many of the prize animals and plants today are new species, artificially created. If man can produce such changes and new species in a relatively short time, what could not Nature do in this line in the course of hundreds of thousands or millions of years ? A visit to a natural history museum, say the South Kensington Museum in London, shows us how plants and animals are continually adapting themselves to nature.

All this seems obvious enough to us now. But it was not so obvious seventy years ago. Most people in Europe still believed at the time in the Biblical account of the creation of the world just 4004 years before Christ, and of each plant and animal being created separately, and finally man. They believed in the Flood and in Noah's Ark with its pairs of animals, so that no species might become extinct. All this did not fit in with the Darwinian theory. Darwin and the geologists talked of millions of years as the age of the earth, and not a paltry 6000 years. So there was a tremendous tussle in the minds of men and women, and many good people did not know what to do. Their old faith told them to believe in one thing, and their reason said another. When people believe blindly in dogmas and the dogmas receive a shock, they feel helpless and miserable and without any solid ground to stand upon. But a shock which wakes us to reality is good.

So there was a great argument and great conflict in England and elsewhere in Europe between science and religion. There could be no doubt of the result. The new world of industry and mechanical transport depended on science, and science thus could not be discarded. Science won all along the line, and "natural selection" and "survival of the fittest" became part of the ordinary jargon of the people, who used the phrases without fully understanding what they meant. Darwin had suggested in his *Descent of Man* that there might

have been a common ancestor of man and certain apes. This could not be proved by examples showing various stages in the process of development. From this there grew the popular joke about the "missing link". And, curiously enough the ruling classes twisted Darwin's theory to suit their own convenience, and were firmly convinced that it supplied yet another proof of their superiority. They were the fittest to survive in the battle of life, and so by "natural selection" they had come out on top and were the ruling class. This became the justification for one class dominating over another, or one race ruling over another. It became the final argument of imperialism and the supremacy of the white race. And many people in the West thought that the more domineering they were, the more ruthless and strong, the higher up in the scale of human values they were likely to be. It is not a pleasant philosophy, but it explains to some extent the conduct of western imperialist Powers in Asia and Africa.

Darwin's theories have been criticized subsequently by other scientists, but his general ideas still hold. One of the results of a general acceptance of his theories was to make people believe in the idea of progress, which meant that man and society, and the world as a whole, were marching towards perfection and becoming better and better. This idea of progress was not the result of Darwin's theory alone. The whole trend of scientific discovery and the changes brought about by the Industrial Revolution and afterwards had prepared people's minds for it. Darwin's theory confirmed it, and people began to imagine themselves as marching proudly from victory to victory to the goal of human perfection, whatever that might be. It is interesting to note that this idea of progress was quite a new one. There seems to have been no such idea in the past in Europe or Asia, or in any of the old civilizations. In Europe, right up to the Industrial Revolution, people looked upon the past as the ideal period. The old Greek and Roman classical period was supposed to be finer and more advanced and cultured than subsequent periods. There was progressive deterioration or worsening of the race, so people thought, or at any rate there was no marked change.

In India there is much the same idea of deterioration, of a golden age that is past. Indian mythology measures time in enormous periods, like the geological periods, but always it begins with the great age, *Satya Yuga*, and comes down to the present age of evil, the *Kali Yuga*.

So we see that the idea of human progress is quite a modern notion. Our knowledge of past history, such as it is, makes us believe in this idea. But, then, our knowledge is still very limited, and it may be that with fuller knowledge our outlook might change. Even today there is not quite the same enthusiasm about "progress" as there was in the second half of the nineteenth century. If progress leads us to destroy each other on a vast scale, as was done in the World War, there is something wrong with such progress. Another thing worth remembering is that Darwin's "survival of the fittest" does not necessarily mean the survival of the best. All these are speculations for the learned. What we have to note is that the old and widespread idea of a static or unchanging, or even deteriorating, society was pushed aside by modern science in the nineteenth century, and in its place came the idea of a dynamic and changing society. Also there came the idea of progress. And indeed society did change out of all recognition during this period.

As I have been telling you of Darwin's theory of the origin of species, it might interest you to know what a Chinese philosopher wrote on the subject 2500 years ago. Tson Tse was his name, and he wrote in the sixth century before Christ, about the time of the Buddha:

"All organisms are originated from a single species. This single species had undergone many gradual and continuous changes, and then gave rise to all organisms of different forms. Such organisms were not differentiated immediately, but, on the contrary, they acquired their differences through gradual change, generation after generation."

This is near enough to Darwin's theory, and it is amazing that the old Chinese biologist should have arrived at a conclusion which it took the world two and a half millennia to rediscover.

As the nineteenth century progressed the rate of change became ever faster. Science produced wonder after wonder, and an endless pageant of discovery and invention dazzled people's eyes. Many of these discoveries changed the life of the people greatly, like the telegraph, the telephone, the automobile and later the aeroplane. Science dared to measure the farthest heavens and also the invisible atom and its still smaller components. It lessened the drudgery of man, and life became easier for millions. Because of science there was a tremendous increase in the population of the world, and especially of the industrial countries. At the same time science evolved the most thoroughgoing methods of destruction. But this was not the

fault of science. It increased man's command over Nature, but man with all this power did not know how to command himself. And so he misbehaved often and wasted the gifts of science. But the trimuphant march of science went on, and within 150 years this changed the world more than all the previous many thousand years had done. Indeed, in every direction and in every department of life science has revolutionized the world.

This march of science is continuing even now, and it seems to rush on faster than ever. There is no rest for it. A railway is built. By the time it is ready to function it is already out of date. A machine is bought and fixed up; within a year or two better and more efficient machines of that very kind are being made. And so the mad race goes on, and now in our time electricity is replacing steam, and thus bringing about as great a revolution as the Industrial Revolution of a century and a half ago.

Vast numbers of scientists and experts are continually at work in the numerous highways and byways of science. The greatest name in their ranks today is that of Albert Einstein, who has succeeded in modifying to some extent the famous theory of Newton.

So vast has been the recent progress in science and so great the additions and changes in scientific theory, that scientists themselves have been taken aback. They have lost all their old complacency and pride of certainty. They are hesitant now about their conclusions and their prophecies for the future.

But this is a development of the twentieth century and our own day. In the nineteenth century there was full assurance, and science, priding itself on its innumerable successes, imposed itself on the people and they bowed down to it as to a god.

(Letter written by Pandit Jawaharlal Nehru to 16 year old daughter Smt. Indira Priyadarshini (Indira Gandhi) on Feburary 3, 1933 from Prison. Taken from the 'Glimpses of World History' *by Pandit Jawaharlal Nehru).*

Fearlessness is the first prerequisite of spirituality. A coward can never have any morals.

— Mahatma Gandhi

3

Debunking, Neutrality, and Skepticism in Science

Paul Kurtz

The term *paranormal* was not invented by the Committee for the Scientific Investigation of Claims of the Paranormal but has been widely used, first by parapsychologists and later by others to refer to anomalous phenomena that allegedly could not be explained in terms of the existing categories of science. "Paranormal" refers to that which is "beside" or even "beyond" the range of normal experience and explanation. It is used to depict phenomena like clairvoyance, precognition, telepathy, psychokinesis, levitation, poltergeists, astral projection, automatic writing, communication with discarnate spirits, and so on.

Most skeptics deny that the term *paranormal* has any clearly identifiable meaning. Like the "noumenal," "occult," or even "supernatural," its precise referents are vague and ambiguous. The boundaries of human knowledge are constantly expanding and being refined, and what was unknowable yesterday may become scientifically explicable the next day; thus the DNA code, the concept of black holes, and newly postulated sub-atomic particles surely cannot be said to have been "paranormal" when they were initially proposed. Is the paranormal simply equivalent to that which is "unfamiliar" or "strange" at one state in the development of human knowledge? If so, that would not make it unusual. The term *paranormal* has also been stretched far beyond parapsychology to other, so-called mysterious powers within the universe not contained within the parameters of our existing conceptual framework. It has been used to refer to such disparate phenomena as reincarnation, life after life, biorhythms, astrology, UFOs, Chariots of the Gods, the Bermuda Triangle, monsters of the deep—whether Nessie, Chessie, or Champie—Bigfoot, cattle mutilations, human spontaneous combus-

tion, psychic archaeology, and faith healing; in short, almost anything that comes within the range of human imagination and is thought to be "incredible".

On the current world-scene, belief in the paranormal is fed and reinforced by a vast media industry that profits from it; and it has been transformed into a folk religion, perhaps the dominant one today. Curiously, it is often presented as "scientifically warranted" and as a new, if bizarre, conception of reality that is breaking down our naturalistic-materialistic view of the universe.

Contemporary science is rapidly expanding in many directions: On the macrolevel, astronomy reports exciting new discoveries. The quest for extraterrestrial life is one of the most dramatic adventures of our time. This is grist for science fiction and the poetic imagination, outstripping that which has been verified or is technologically feasible today. On the microlevel, physicists postulate new particles in an attempt to unravel the nature of physical reality. And in the life sciences, biologists are decoding the genetic basis of life and are on the threshold of creating new forms. At the same time, the information revolution unfolds stunning new applications.

Men and women have always been fascinated by the depths of the unknown. As far back as we can trace there has been an interest in the occult and the magical. The persistence and growth of ancient paranormal beliefs in our highly educated scientific-technological civilization is a puzzling phenomenon to many of us. There are many reasons for this, not the least of which are the fast pace of scientific progress, the role of science fiction in stimulating the imagination, and the breakthrough into space beyond our planet. And so people ask, for example, why is it not possible for the mind to engage in remote viewing of far distant scenes and events, precognate or retrocognate, or to exist in some form separate from the body. Present-day science for many seems to demonstrate that virtually *anything* is possible, and that what was once thought to be impractical or unreal can later be found to be so. And they think perhaps psi phenomena, biorhythms and horoscopes, faith healing and extraterrestrial UFOs are genuine. There is some confusion in the public mind between the possible and the actual, and for many people the fact that something is possible converts it into the actual.

Some skeptics have dissented, maintaining that since paranormal concepts contradict the basic conceptual categories by which we

understand and interpret the world, they may be rejected on a priori grounds. In my view, it is difficult to impose preconceived limits to inquiry or to rule out such claims as logically "impossible." The history of science is littered with such vain attempts. Whether or not paranormal phenomena exist and, if they do, how they may be interpreted can only be determined in the last analysis within the process of scientific verification and validation and not antecedent to it.

What Should be the Role of Science?

Now the question is often raised: How should science deal with the paranormal?

One familiar response is that science should ignore the paranormal entirely. Many scientists until recently considered it beneath their dignity to become involved in what they viewed as patent nonsense. This has not been the response of those scientists and scholars associated with CSICOP. We believe that such claims ought to be investigated because of the widespread public interest and also because some paranormalists on the borderlands of science claim to have made significant discoveries.

If one decides to examine such claims, how does one proceed? One way is to debunk nonsensical paranormal beliefs. Martin Gardner quotes H. L. Mencken to the effect that "one horse-laugh is worth a thousand syllogisms." Some people have insisted that debunking is not an appropriate activity, particularly for academic scientist. To "debunk" means "to correct a misapprehension, to disabuse, set right, put straight, open the eyes or clear the mind, disenchant, or dispose of illusion, unfoil, unmask, or tell the truth" *(Roget's Thesaurus)*. Some of the claims that are made—even by scientists and scholars—are preposterous and debunking is not an illegitimate activity in dealing with them. Sometimes the best way to refute such a claim is to show how foolish it is, and to do so graphically. Indeed, debunking, in its place, is a perfectly respectable intellectual activity that any number of great writers have engaged in with wit and wisdom: Plato and Socrates, Voltaire, Shaw, and Mencken, to mention only some. Surely it has a place within philosophy, politics, religion and on the borderlands of science and pseudoscience. It should not, however, be abused but should be used with caution; and it should be based upon a careful examination of the facts.

But there are dangers here: Sometimes what appears to be bunkum because it does not accord with the existing level of "common

sense" may turn out to be true. Mere prejudice and dogma may supplant inquiry. If one debunks, he had better command an arsenal of facts and marshal evidence to show *why* something is improbable or even downright false. We can ask, Does sleeping under a pyramid increase sexual potency? Do plants have ESP and will talking to them enhance their growth? Do taperecorders really pick up voices of the dead? All of these claims have been proposed by paranormalists within the past decade. They should not be rejected out of hand. On the other hand, at some point—after inquiry, not before—they may deserve forceful debunking; this is particularly the case when scholarly critiques of inflated claims go unnoticed by the public. Jeane Dixon and Uri Geller, for example, seem as unsinkable as rubber ducks—though some of us have attempted to make duck soup out of them. Thus we are concerned not simply with paranormal beliefs in the laboratory but with their dramatization in the media.

Another response to the paranormalists is to maintain that we should examine each and every claim—however far-fetched—that anyone makes, and to give it equal and impartial hearing. There are literally thousands of claims pouring forth each year. One cannot possibly deal with them all. We receive a goodly number of calls and letters every week at the offices of CSICOP from people who claim that they have prophetic powers, are reincarnated, or have been abducted aboard UFOs. Some of our critics nevertheless have insisted that this is the only appropriate response for science to make: to be neutral about them all. After all, were not Galileo and Semmelweis, and ven Velikovsky, suppressed by the scientific and intellectual establisments of their day? And might not we in our day likewise reject an unconventional or heretical point of view simply because it is not in accord with the prevailing intellectual fashion? I repeat: This is a danger that we need especially to avoid. For the history of science is full of radical departures from established principles. Thus we must keep an open mind about unsuspected possibilities still to be discovered.

However, one should make a distinction between the open mind and the open sink. The former uses certain critical standards of inquiry and employs rigorous methodological criteria that enable one to separate the genuine from the patently specious, and yet to give a fair hearing to the serious heretic within the domain of science. Isaac Asimov has made a useful distinction between *endoheresies*,

which are deviations made *within* science, and *exoheresies,* which are deviations made *outside* of science by those who do not use objective methods of inquiry and whose theories cannot be submitted to test, replication, validation, or corroboration. Even here one must be extremely cautious, for an exoheretic may be founding a new science. A protoscience may thus be emerging that deserves careful appraisal by the scientific and intellectual community. Or the exoheretic may simply be a crank—even though he or she may have a wide public following and be encouraged by the powerful effects of extensive media coverage. Simply neutrality in the face of this may be a form of self deception.

Philosopher Paul Feyerabend has maintained that there are virtually no standards of scientific objectivity and that one theory can be as true as the next. But I submit that he is mistaken. If we cannot always easily demarcate antecedent to inquiry pseudo from genuine science, we can after the fact apply critical standards of evaluation. Within these limited confines, then, I submit that some debunking is not only useful but necessary, particularly if we are to deal with the realities of belief in our media-coddled society. Given the level of ready public acceptance of the "incredible" and a tendency toward gullibility, one horse-laugh in its appropriate setting may be worth a dozen scholarly papers, though never at the price of the latter.

There is still another response to bizarre claims. In the last analysis this is the most important posture to assume; namely, if a paranormal claim is seriously proposed and if some effort is made to support it by responsible research methods, them it does warrant serious examination. I am not talking about antiscientific, religious, subjective, or emotive approaches to the paranormal, which abound, but efforts by serious inquiries to present hypotheses or conclusions based upon objective research. This is the case with parapsychology, which today deserves a fair and responsible hearing. Going back at least a century, some of the important thinkers—Philosophers, Psychologists, and Physical Scientists—have investigated the Psychical: William James, Henry Sidgwicks, H. H. Price, Oliver Lodge, William Crookes, and more recently Gardner Murphy and J. B. Rhine. Their work deserves careful analysis, though it is not immune to strong criticism on methodological and evidential grounds. Similarly for some aspects of recent UFO and astrological research. If there are falsifiable claims and conceptually coherent theories, then

they need rigorous testing and careful logical analysis by independent scientific investigation. And here neutrality in the process of evaluation is the only legitimate approach; take a hypothesis, examine the experimental data reported, attempt to replicate the experiment, make predictions, and see if the theories are logically consistent and can be verified.

That this same neutrality should apply to fortune telling, horoscopes, tarot cards, palmistry, fortune cookies, and other popular fields is another matter. Take them into the laboratory to see if you can get results. But if you get no results, then the only response often is to debunk them.

What is Skepticism?

Now it is no secret that CSICOP has been identified with the skeptical position. We have said that we do not find adequate support for many or most of the claims of the paranormal that have been made both within and without science. We have been bitterly attacked by paranormal magazines and newspapers (such as *Fate* magazine) for publishing debunking articles at the same time these publications purvey misinformation to the public and seek to sell everything from crystal balls to Ouija boards. We believe that both debunking and careful scientific examination should be done. In regard to the latter, we often find in the parasciences a lack of replication, inadequate experimental design (as in J. B. Rhine's early experiments), and questionable interpretation of statistical data (as in the remote-viewing experiments of Targ and Puthoff). Sometimes—but only sometimes—there is fraud or deceit (as in the case of S. G. Soal, Walter Levy, and others), but underlying it all there is a strong will to believe (as Project Alpha has shown).

Skepticism is among the oldest intellectual traditions in philosophy, and it can be traced back to ancient philosophers like Carneades, Pyrrho, and Sextus Empiricus, and in modern thought to Descartes, Locke, Berkeley, Hume and Kant. Today skepticism is essential to the very life-blood of scientific inquiry.

There are many forms that skepticism can assume. One form it may take is universal doubt, the attitude that the reality of the senses and the validity of rational inference should be mistrusted. For this form of skepticism one must adopt an *epoché* in regard to all things; that is, assume the role of the agnostic and suspend judgment. Since one position is as good as the next, and all positions may be

equally false, none can be said to be true. In philosophy, this has led to extreme solipsism, where one doubts not only the reality of the external world but one's own existence. In ethics, it has led to extreme subjectivism, a mistrust of reason, and a denial that there are any objective ethical standards; for values, it is held, are rooted in personal taste and caprice. In science, universal skepticism has led to methodological anarchism, the view that all scientific positions depend upon the mere prejudices of the scientific community and the shifts in paradigms that occur. If this is the case, astrology would be as true as astronomy and psychic phenomena as real as subatomic physics. Such a form of skepticism is easily transformed into the kind of "neutralism" discussed above—since all positions may be equally true or false, we have no way of judging their adequacy.

Universal skepticism is negative, self-defeating, and contradictory. One cannot consistently function as a total skeptic but must assume certain principles of inquiry, some of which turn out to be more reliable than others. We must act upon the best evidence we have, as our beliefs confront the external world independent of our wishes. Moreover, we do have well-tested hypotheses that may be held with varying degrees of probability and incorporated into the body of knowledge. The skeptic's own universal principle that there is no reliable knowledge must apply to itself; and, if so, we are led to doubt its range of applicability. A universal skepticism is limited by its own criteria. If we assume it to be true, then it is false; since if it applies to everything, it applies to itself, and hence universal skepticism cannot be universal. I do not wish to become impaled by the logic of types. The point I want to make is simply that the most meaningful form of skepticism is a *selective* one. This maintains that doubt is limited to the context of inquiry. We cannot at the same time doubt all of our presuppositions, though we may in other contexts examine each in turn. The doubt that properly emerges is within a problematic context of inquiry and thus can be settled ony by the relevant evidence—though perhaps not completely.

What I mean is that the scientific community is always faced with new research problems, and it seeks solutions to these problems (a) in the theoretical sciences, through explanations of what is happening and why, (b) in the technological and applied sciences, by resolving questions of application. There are alternative theories or hypotheses that may be proposed and compete for acceptance.

Some of them may fall by the wayside; those that win out seem to accord best with the relevant data and the conceptual framework at hand, though these may in turn be eventually modified.

Clearly, a researcher should suspend judgment until he can confirm his hypothesis and until it is corroborated by other inquirers. However, no one law or theory can be said to be final or absolute, or to have reached its ultimate formulation. Here Charles Peirce's famous "principle of fallibilism" plays a role: for we may be in error, we may uncover new data, or alternative hypotheses may be found to fit the data more adequately. Thus we must be prepared to admit new hypotheses, however novel or unlikely they may at first appear. Science is open to revision of its theories: The self-corrective process is on-going. We must always be willing to entertain and not rule out new ideas. This applies to the established sciences, but also to newly emerging proto-or para-sciences.

Conclusion

I am often asked why belief in the paranormal is so strong in the world today, and especially in highly developed and highly educated scientific-technological societies like our own. There are many explanations that can be and have been given. I wish to conclude by mentioning only two.

First is the fact that we exist in a religious culture of longstanding historic traditions, and dissenting points of view in the area of religion are not given a fair hearing. Since belief in the supernatural and occult remains largely unchallenged, the paranormalist finds a receptive audience. There are at least two cultures existing side by side. On the one hand, the religious, and on the other the rational-philosophic-scientific. Until the religious is submitted to intellectual critique openly and forthrightly, the paranormal will continue to flourish on the fringe of science.

The second reason is that although we are a scientific culture we have not thus far succeeded in our curricula of scientific education in conveying the meaning of science. There is a widespread appreciation for the benefits of scientific technology, particularly for its economic value, as new industries are being spawned at a breathtaking pace. But at the same time there exists fear of science and its possible implications for other aspects of life. Sadly our elementary and high schools, colleges and universities, turn out specialists who may be extremely competent in their narrow fields of expertise, but

who lack an appreciation for the broader scientific outlook. Within their own fields students are able to master their subject matter and apply the methods of science and critical intelligence, but these methods often do not spill over to other areas of belief.

In my view, a major task we face is proper education in science, both in the schools and for the general public. There is a failure to appreciate the importance of skeptical thinking. A truly educated person should come to appreciate the tentative character of much of human knowledge. The burden of proof always rests upon the claimant to warrant his claim. If all the facts do not support it, then we should suspend judgment.

Science surely is not to be taken as infallible, and some of the defects found in the pseudo- and para-sciences can be found in the established sciences as well, though on a reduced scale. Scientists are fallible, and they are as prone to error as everyone else—though it is hoped that the self-corrective process of scientific inquiry will bring these errors to the light of day. Similarly, it would be presumptuous to maintain that all intelligence and wisdom is on the side of the skeptic; for he may be as liable to error as the next person. Fortunately, we have our critics and they are only too willing to point that out—for which we should be grateful. We have made mistakes and have sought to correct them. We should not trust anyone to have all the truth, and this applies to ourselves as well.

Whether life can be lived truly rationally and whether all of our beliefs can be tested before we accept them is a topic that philosophers have long debated. Suffice it to say that selective skepticism can have a constructive and positive role in life, that some degree of skepticism is important, and that reflective individuals will learn to appreciate its value.

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SPIRIT OF SCIENCE

We must conclude that the attention and respect accorded to science is directed wholly to its results, and its spirit is the most unpopular thing in the modern world. Yet it could very reasonably be claimed that it is in its spirit and the chief value of science resides.

J. W. N. Sullivan—*'LIMITATIONS OF SCIENCE'*

4

Night Walkers and Mystery Mongers: Sense and Nonsense At the Edge of Science

Carl Sagan

In Greece of the second century A.D., during the reign of the Roman Emperor Marcus Aurelius, there lived a master con man named Alexander of Abonutichus. Handsome, clever, and totally unscrupulous, in the words of one of his contemporaries, he "went about living on occult pretensions." In his most famous imposture, "he rushed into the marketplace, naked except for a gold-spangled loincloth; with nothing but this and his scimitar, and shaking his long, loose hair, like fanatics who collect money in the name of Cybele, he climbed onto a lofty altar and delivered a harangue" predicting the advent of a new and oracular god. Alexander then raced to the construction site of a temple, the crowd streaming after him, and discovered—where he had previously buried it—a goose egg in which he had sealed up a baby snake. Opening the egg, he announced the snakelet as the prophesied god. Alexander retired to his house for a few days, and then admitted the breathless crowds, who observed his body now entwined with a large serpent; the snake had grown impressively in the interim.

The serpent was, in fact, of a large and conveniently docile variety, procured for this purpose earlier in Macedonia, and outfitted with a linen head of somewhat human countenance. The room was dimly lit. Because of the press of the crowd, no visitor could stay for very long or inspect the serpent very carefully. The opinion of the multitude was that the seer had indeed delivered a god.

Alexander then pronounced the god ready to answer written

questions delivered in sealed envelopes. When alone, he would lift off or duplicate the seal, read the message, remake the envelope, and attach a response. People flocked from all over the Empire to witness this marvel, an oracular serpent with the head of a man. In those cases where the oracale later proved not just ambiguous but grossly wrong. Alexander had a simple solution : He altered his record of the response he had given. And if the question of a rich man or woman revealed some weakness or guilty secret, Alexander did not scruple at extortion. The result of all this imposture was an income equivalent today to several hundred thousand dollars per year and fame rivaled by few men of his time.

We may smile at Alexander the Oracle-Monger. Of course we all would like to foretell the future and make contact with the gods. But we would not nowadays be taken in by such a fraud. Or would we? M. Lamar Keene spent thirteen years as a spiritualist medium. He was pastor of the New Age Assembly Church in Tampa, a trustee of the Universal Spiritualist Association, and for many years a leading figure in the mainstream of the American spiritualist movement. He is also a self-confessed fraud who believes, from first-hand knowledge, that virtually all spirit readings, séances, and mediumistic messages from the dead are conscious deceptions, contrived to exploit the grief and longing we feel for deceased friends and relatives. Keene, like Alexander, would answer questions given to him in sealed envelopes—in this case not in private, but on the pulpit. He viewed the contents with a concealed bright lamp or by smearing lighter fluid, either of which can render the envelope momentarily transparent. He would find lost objects, present people with astounding revelations about their private lives which "no one could know," commune with the spirits and materialize ectoplasm in the darkness of the séance—all based on the simplest tricks, an unswerving self-confidence, and most of all on the monumental credulity, the utter lack of skepticism he found in his parishioners and clients. Keene believes, as did Harry Houdini, that not only is such fraud rampant among the spiritualists but also that they are highly organized to exchange data on potential clients in order to make the revelations of the séance more astonishing. Like the viewing of Alexander's serpent, the séances all take place in darkened rooms—because the deception would be too easily penetrated in the light. In his peak earning years, Keen earned about as much, in equivalent

purchasing power, as Alexander of Abonutichus.

From Alexander's time to our own—indeed, probably for as long as human beings have inhabited this planet—people have discovered they could make money by pretending to arcane or occult knowledge. A charming and enlightning account of some of these bamboozles can be found in a remarkable book published in 1852 in London, *Extraordinary Popular Delusions and the Madness of Crowds,* by Charles Mackay. Bernard Baruch claimed that the book saved him millions of dollars—presumably by alerting him to which idiot schemes he should not invest his money in. Mackay's treatment ranges from alchemy, prophecy, and faith healing, to haunted houses, the Crusades, and the "influence of politics and religion on the hair and beard." The value of the book, like the account of Alexander the Oracle-Monger, lies in the remoteness of the frauds and delusions described. Many of the impostures do not have a contemporary ring and only weakly engage our passions: It becomes clear how people in other times were deceived. But after reading many such cases, we begin to wonder what the comparable contemporary versions are. People's feelings are as strong as they always were, and skepticism is probably as unfashionable today as in any other age. Accordingly, there ought to be bamboozles galore in contemporary society. And there are.

In the past hundred years—whether for good or for ill—science has emerged in the popular mind as the primary means of penetrating the secrets of the universe, so we should expect many contemporary bamboozles to have a scientific ring. And they do.

Within the last century or so, many claims have been made at the edge or border of science—assertions that excite popular interest and, in many cases, that would be of profound scientific importance if only they were true. These claims are out of the ordinary, a break from the humdrum world, and often imply something hopeful: for example, that we have vast, untapped powers, or that unseen forces are about to save us from ourselves, or that there is a still unacknowledged pattern and harmony to the universe. Well, science does sometimes make such claims—as, for example, the realization that the hereditary information we pass from generation to generation is encoded in a single long molecule called DNA, in the discovery of universal gravitation or continental drift, in the tapping of nuclear energy, in research on the origin of life or on the early history of the

universe. So if some additional claim is made—for example, that it is possible to float in the air unaided, by a special effort of will—what is so different about that? Nothing. Except for the matter of proof. Those who claim that levitation occurs have an obligation to demonstrate their contention before skeptics, under controlled conditions. The burden of proof is on them, not on those who might be dubious. Such claims are too important to think about carelessly. Many assertions about levitation have been made in the past hundred years, but motion pictures of well-illuminated people rising unassisted fifteen feet into the air have never been taken under conditions which exclude fraud. If levitation were possible, its scientific and, more generally, its human implications would be enormous. Those who make uncritical observations or fraudulent claims lead us into error and deflect from us the major human goal of understanding how the world works. It is for this reason that playing fast and loose with the truth is a very serious matter.

One of the most striking apparent instances of extrasensory perception is the precognitive experience, when a person has a compelling perception of an imminent disaster, the death of a loved one, or a communication from a long-lost friend, and the predicted event then occurs. Many who have had such experiences report that the emotional inensity of the precognition and its subsequent verification provide an overpowering sense of contact with another realm of reality. I have had such an experience myself. Many years ago I awoke in the dead of night in a cold sweat, with the certain knowledge that a close relative had suddenly died. I was so gripped with the haunting intensity of the experience that I was afraid to place a long-distance phone call, for fear that the relative would trip over the telephone cord (or something) and make the experience a self-fulfilling prophecy. In fact, the relative is alive and well, and whatever psychological roots the experience may have, it was not a reflection of an imminent event in the real world.

However, suppose the relative had in fact died that night. You would have had a difficult time convincing me that it was merely coincidence. But it is easy to calculate that, if each American has such a premonitory experience a few times in his lifetime, the actuarial statistics alone will produce a few *apparent* precognitive events somewhere in America each year. We can calculate that this must occur fairly frequently, but to the rare person who dreams of disaster,

followed rapidly by its realization, it is uncanny and awesome. Such a coincidence must happen to *someone* every few months. But those who experience a correct precognition understandably resist its explanation by coincidence.

After my experience I did not write a letter to an institute of parapsychology relating a compelling predictive dream which was not borne out by reality. That is not a memorable letter. But had the death I dreamt actually occurred, such a letter would have been down as evidence of precognition. The hits are recorded, the misses are not. Thus human nature unconsciously conspires to produce a biased reporting of the frequency of such events.

Precognitive dreams are typical of claims made on the boundary or edge of science. An amazing assertion is made, something out of the ordinary, marvelous, or awesome—or at least not tedious. It survives superficial scrutiny by lay people and, sometimes, more detailed study and more impressive endorsement by celebrities and scientists. Those who accept the validity of the assertion resist all attempts at conventional explanation. The most common correct explanations are of two sorts. One is conscious fraud, usually by those with a financial interest in the outcome. Those who accept the phenomena have been bamboozled. The other explanation often applies when the phenomena are uncommonly subtle and complex, when nature is more intricate than we have guessed, when deeper study is required for understanding. Many precognitive dreams fit this second explanation. Here, very often, we bamboozle ourselves.

I make a distinction between those who perpetrate and promote borderline belief systems and those who accept them. The latter are often taken by the novelty of the systems and the feeling of insight and grandeur they provide. These are in fact scientific attitudes and scientific goals. It is easy to imagine extraterrestrial visitors who looked like human beings, flew space vehicles and even airplanes like our own, and taught our ancestors civilization. This does not strain our imaginative powers overly and is sufficiently similar to familiar Western religious stories to seem comfortable. The search for Martian microbes of exotic biochemistry, or for interstellar radio messages from intelligent beings biologically very dissimilar, is more difficult to grasp and not as comforting. The former view is widely purveyed and available; the latter much less so. Yet I think many of those excited by the idea of ancient astronauts are motivat-

ed by sincere scientific (and occassionally religious) feelings. There is a vast untapped popular interest in the deepest scientific questions. For many people, the shoddily thought out doctrines of borderline science are the closest approximation to comprehensible science readily available. The popularity of borderline science is a rebuke to the schools, the press, and commercial television for their sparse, unimaginative, and ineffective efforts at science education; and to us scientists for doing so little to popularize our subject.

Flying saucers, or UFOs, are well known to almost everyone. But seeing a strange light in the sky does not mean that we are being visited by beings from the planet Venus or a distant galaxy named Spectra. It might, for example, be an automobile headlight reflected off a high-altitude cloud, or a flight of luminescent insects, or an unconventional aircraft, or a conventional aircraft with unconventional lighting patterns, such as a high-intensity searchlight used for meteorological observations. There are also a number of cases—closer encounters with some highish index numeral—where one or two people claim to have been taken aboard an alien spaceship, prodded and probed with unconventional medical instruments, and released. But in these cases we have only the unsubstantiated testimony, no matter how heartfelt and seemingly sincere, of one or two people. To the best of my knowledge there are no instances out of the hundreds of thousands of UFO reports filed since 1947—not a single one—in which many people independently and reliably report a close encounter with what is clearly an alien spacecraft.

Not only is there an absence of good anecdotal evidence; there is no physical evidence either. Our laboratories are very sophisticated. A product of alien manufacture might readily be identified as such. Yet no one has ever turned up even a small fragment of an alien spacecraft that has passed any such physical test—much less the logbook of the starship captain. It is for these reasons that in 1977 NASA declined an invitation from the Executive Office of the President to undertake a serious investigation of UFO reports. When hoaxes and mere anecdotes are excluded, there seems to be nothing left to study.

Once I spied a bright, "hovering" UFO, and pointing it out to some friends in a restaurant soon found myself in the midst of a throng of patrons, waitresses, cooks, and proprietors milling about on the sidewalk, pointing up into the sky with fingers and forks and

making gasps of astonishment. People were somewhere between delighted and awestruck. But when I returned with a pair of binoculars which clearly showed the UFO to be an unconventional aircraft (a NASA weather airplane, as it later turned out), there was uniform disappointment. Some felt embarrassed at the public exposure of their credulity. Others were simply disappointed at the evaporation of a good story, something out of the ordinary—a visitor from another world.

In many such cases we are not unbiased observers. We have an emotional stake in the outcome—perhaps merely because the borderline belief-system, if true, makes the world a more interesting place; but perhaps because there is something that strikes more deeply into the human psyche. If astral projection actually occurs, then it is possible for some thinking and perceiving part of me to leave my body and effortlessly travel to other places—an exhilarating prospect. If spiritualism is real, then my soul will survive the death of my body—possibly a comforting thought. If there is extrasensory perception, then many of us possess latent talents that need only be tapped to make us more powerful than we are. If astrology is right, then our personalities and destinies are intimately tied to the rest of the cosmos. If elves and goblins and fairies truly exist (there is a lovely Victorian picture book showing photographs of six-inch-high undraped ladies with gossamer wings conversing with Victorian gentlemen), then the world is a more intriguing place than most adults have been led to believe. If we are now being or in historical times have been visited by representatives from advanced and benign extraterrestrial civilizations, perhaps the human predicament is not so dire as it seems; perhaps the extraterrestrials will save us from ourselves. But the fact that these propositions charm or stir us does not guarantee their truth. Their truth depends only on whether the evidence is compelling; and my own, and sometimes reluctant, judgment is that compelling evidence for these and many similar propositions simply does not (at least as yet) exist.

What is more, many of these doctrines, if false, are pernicious. In simplistic popular astrology we judge people by one of twelve character types depending on their month of birth. But if the typing is false, we do an injustice to the people we are typing. We place them in previously collected pigeonholes and do not judge them for themselves, a typing familiar in sexism and racism.

Those skeptical of many borderline belief-systems are not necessarily those afraid of novelty. For example, many of my colleagues and I are deeply interested in the possibility of life, intelligent or otherwise, on other planets. But we must be careful not to foist our wishes and fears upon the cosmos. Instead, in the usual scientific tradition, our objective is to find out what the answers really are, independent of our emotional predispositions. If we are alone, that is a truth worth knowing also. No one would be more delighted than I if intelligent extraterrestrials were visiting our planet. It would make my job enormously easier. Indeed, I have spent more time than I care to think about on the UFO and ancient astronaut questions. And public interest in these matters is, I believe, at least in part, a good thing. But our openness to the dazzling possibilities presented by modern science must be tempered by some hard-nosed skepticism. Many interesting possibilities simply turn out to be wrong. An openness to new possibilities and a willingness to ask hard questions are both required to advance our knowledge.

Professional scientists generally have to make a choice in their research goals. There are some objectives that would be very important if achieved but promise so small a likelihood of success that no one is willing to pursue them. (For many years this was the case in the search for extraterrestrial intelligence. The situation has changed mainly because advances in radio technology now permit us to construct enormous radio telescopes with sensitive receivers to pick up any messages that might be sent our way. Never before in human history was this possible). There are other scientific objectives that are perfectly tractable but of entirely trivial significance. Most scientists choose a middle course. As a result, very few scientists actually plunge into the murky waters of testing or challenging borderline or pseudoscientific beliefs. The chance of finding out something really interesting—except about human nature—seems small, and the amount of time required seems large. I believe that scientists should spend more time in discussing these issues, but the fact that a given contention lacks vigorous scientific opposition in no way implies that scientists think it is reasonable.

There are many cases where the belief system is so absurd that scientists dismiss it instantly but never commit their arguments to print. I believe this is a mistake. Science, especially today, depends upon public support. Because most people have, unfortunately, a

very inadequate knowledge of science and technology, intelligent decision-making on scientific issues is difficult. Some pseudoscience is a profitable enterprise, and there are proponents who not only are strongly identified with the issue in question but also make large amounts of money from it. They are willing to commit major resources to defending their contentions. Some scientists seem unwilling to engage in public confrontations on borderline-science issues because of the effort required and the possibility that they will be perceived to lose a public debate. But it is an excellent opportunity to show how science works at its murkier borders, and also a way to convey something of its power as well as its pleasures.

There is stodgy immobility on both sides of the borders of the scientific enterprise. Scientific aloofness and opposition to novelty are as much a problem as public gullibility. A distinguished scientist once threatened to sic then Vice-President Spiro T. Agnew on me if I persisted in organizing a meeting of the American Association for the Advancement of Science in which both proponents and opponents of the extraterrestrial-spacecraft hypothesis of UFO origins would be permitted to speak. Scientists offended by the conclusions of Immanuel Velikovsky's *Worlds in Collusion* and irritated by Velikovsky's total ignorance of many well-established scientific facts successfully and shamefully pressured Velikovsky's publisher to abandon the book—which was then put out by another firm, much to its profit—and when I arranged for a second AAAS symposium to discuss Velikovsky's ideas, I was criticized by a different leading scientist who argued that any public attention, no matter how negative, could only aid Velikovsky's cause.

But these symposia were held, the audiences seemed to find them interesting, the proceedings were published, and now youngsters in Duluth or Fresno can find some books presenting the other side of the issue in their libraries. If science is presented poorly in schools and the media, perhaps some interest can be aroused by well-prepared, comprehensible public discussions at the edge of science. Astrology can be used for discussions of astronomy; alchemy for chemistry; Velikovskian catastrophism and lost continents such as Atlantis for geology; and spiritualism and Scientology for a wide range of issues in psychology and psychiatry.

Scientists are, of course, human. When their passions are excited they may abandon temporarily the ideals of their discipline. But

these ideals, the scientific method, have proved enormously effective. Finding out the way the world really works requires a mix of hunches, intuition, and brilliant creativity; it also requires skeptical scrutiny of every step. It is the tension between creativity and skepticism that has produced the stunning and unexpected findings of science. In my opinion the claims of borderline science pall in comparison with hundreds of recent activities and discoveries in real science, including the existence of two semi-independent brains within each human skull; the reality of black holes; continental drift and collisions; chimpanzee language, massive climatic changes on Mars and Venus; the antiquity of the human species; the search for extraterrestrial life; the elegant self-copying molecular architecture that controls our heredity and evolution; and observational evidence on the origin, nature, and fate of the universe as a whole.

But the success of science, both its intellectual excitement and its practical application, depends upon the self-correcting character of science. There must be a way of testing any valid idea. It must be possible to reproduce any valid experiment. The character or beliefs of the scientists are irrelevant; all that matters is whether the evidence supports his contention. Arguments from authority simply do not count; too many authorities have been mistaken too often. I would like to see these very effective scientific modes of thought communicated by the schools and the media; and it would certainly be an astonishment and delight to see them introduced into politics. Scientists have been known to change their minds completely and publicly when presented with new evidence or new arguments. I cannot recall the last time a politician displayed a similar openness and willingness to change.

Many of the belief systems at the edge or fringe of science are not subject to crisp experimentation. They are anecdotal, depending entirely on the validity of eyewitnesses, who in general are notoriously unreliable. On the basis of past performance most such fringe systems will turn out to be invalid. But we cannot reject out of hand, any more than we can accept at face value, all such contentions. For example, the idea that large rocks can drop from the skies was considered absurd by eighteenth-century scientists; Thomas Jefferson remarked about one such account that he would rather believe that two Yankee scientists lied than that stones fell from the heavens. Neverthless, stones do fall from the heavens. They are called meteo-

rites, and our preconceptions have no bearing on the truth of the matter. But the truth was established only by a careful analysis of dozens of independent witnesses to a common meteorite fall, supported by a great body of physical evidence, including meteorites recovered from the eaves of houses and the furrows of plowed fields.

Prejudice means literally pre-judgment, the rejection of a contention out of hand, before examining the evidence. If we wish to find out the truth of the matter we must approach the question with as open a mind as we can, and with a deep awareness of our own limitations and predispositions. On the other hand, if after carefully and openly examining the evidence, we reject the proposition, that is not prejudice. It might be called "post-judice." It is certainly a prerequisite for knowledge.

Critical and skeptical examination is the method used in everyday practical matters as well as in science. When buying a new or used car, we think it prudent to insist on written warranties, test drives, and checks of particular parts. We are very careful about car dealers who are evasive on these points. Yet the practitioners of many borderline beliefs are offended when subjected to similarly close scrutiny. Many who claim to have extra-sensory perception also claim that their abilities decline when they are carefully watched. The magician Uri Geller is happy to warp keys and cutlery in the vicinity of scientists—who, in their confrontations with nature, are used to an adversary who fights fair—but is greatly affronted at the idea of performances before an audience of skeptical magicians—who, understanding human limitations, are themselves able to perform similar effects by sleight of hand. Where skeptical observation and discussion are suppressed, the truth is hidden. The proponents of such borderline beliefs, when criticized, often point to geniuses of the past who were ridiculed. But the fact that some geniuses were laughed at does not imply that all who are laughed at are geniuses. They laughed at Columbus, they laughed at Fulton, they laughed at the Wright brothers. But they also laughed at Bozo the Clown.

The best antidote for pseudoscience, I firmly believe, is science:

- There is an African fresh-water fish that is blind. It generates a standing electric field, through perturbations in which it distinguishes between predators and prey and communicates in a fairly

elaborate electrical language with potential mates and other fish of the same species. This involves an entire organ system and sensory capability completely unknown to pretechnological human beings.

• There is a kind of arithmetic, perfectly reasonable and self-contained, in which two times one does not equal one times two.

• Pigeons—one of the least prepossessing animals on Earth—are now found to have a remarkable sensitivity to magnetic-field strengths as small as one hundred thousandth of that of the Earth's magnetic dipole. Pigeons evidently use this sensory capability for navigation and sense their surroundings by their magnetic signatures: metal gutters, electrical power lines, fire escapes and the like—a sensory modality glimpsed by no human being who ever lived.

• Quasars seem to be explosions of almost unimaginable violence in the hearts of galaxies which destroy millions of worlds, many of them perhaps inhabited.

• In an East African volcanic-ash flow 3.5 million years old there are footprints—of a being about four feet high with a purposeful stride that may be the common ancestor of apes and men. Nearby are the prints of a knuckle-walking primate corresponding to no animal yet discovered.

• Each of our cells contains dozens of tiny factories called mitochondria which combine our food with molecular oxygen in order to extract energy in convenient form. Recent evidence suggests that billions of years ago the mitochondria were free organisms which have slowly evolved into a mutually dependent relation with the cell. When many-celled organisms arose, the arrangement was retained. In a very real sense, then, we are not a single organism, but an array of about ten trillion beings and not all of the same kind.

• Mars has a volcano almost 80,000 feet high which was constructed about a billion years ago. An even larger volcano may exist on Venus.

• Radio telescopes have detected the cosmic black-body background radiation, the distance echo of the event called the Big Bang. The fires of creation are being observed today.

I could continue such a list almost indefinitely. I believe that even a smattering of such findings in modern science and mathematics is far more compelling and exciting than most of the doctrines of pseudoscience, whose practitioners were condemned as early as the fifth century B.C. by the Ionian philosopher Heraclitus as "night-

walkers, magicians, priests of Bacchus, priestesses of the wine-vat, mystery-mongers." But science is more intricate and subtle, reveals a much richer universe, and powerfully evokes our sense of wonder. And it has the additional and important virtue—to whatever extent the world has any meaning—of being true.

(*The Skeptical Inquirer*—Vol. X No. 3-Spring 1986)

THE COLUMBUS 'POLTERGEIST' CASE

Early this spring, when reports began to surface of an alleged poltergeist terrorizing the Resch family of Columbus, Ohio, CSICOP was besieged with requests to investigate. Extensive media coverage indicated that the mysterious disturbances-objects flying through the air, electric lights spontaneously going on and off, the bathroom shower turning on by itself, etc., occurred only when the Resches' 14-year-old adopted daughter Tina was present. A Columbus Dispatch photo showed a telephone receiver flying through the air. Numerous visitors and reporters on the scene attested to these phenomena.

Especially interest was an ABC-TV-affiliate videotape of Tina, taken at a time when she was unaware that the camera was running. When the tape was shown on ABC stations in slow motion, on the two occasions of supposed poltergeist activity Tina was seen to knock down a lamp by sleight of hand—a clear indication of trickery.

CSICOP sent a three-man team to Columbus to investigate; James Randi and professors Steven Shore and Nicholas Sanduleak of Case Western Reserve University. When the three arrived in Columbus, they were refused entrance to the Resch home, while at the same time William Roll, the well-known parapsychologist from Chapel Hill, North Carolina, was admitted.

Although not allowed in the house, the CSICOP team intensively questioned, in person or by phone, most of the participants—the parents of Tina Resch, reporters, photographers, TV Cameramen, and others who had been at the house. It appears that none of those interviewed ever saw a stationary object take off, but only witnessed the objects flying through the air. This was also true of the phenomenon of the flying phone, which was easily replicated. These facts strongly suggest further trickery.

After spending several days at the house, Roll maintained that Tina Resch had demonstrated RSPK (recurrent spontaneous psychokinesis) and he spirited her back to North Carolina for further testing.

It is the considered judgment of Committee investigators that it is impossible to distinguish between what occurred at the Resch house and a simple hoax. Indeed, the Columbus "poltergeist" may well turn out to be a classic case of media misinformation and public gullibility provoked in large measure by an adolescent with serious behavioral problems.

Randi, Shore, and Sanduleak will publish an extensive and detailed report of their investigation in a future issue of the SKEPTICAL INQUIRER.

— PAUL KURTZ

5

Bangalore University Investigations on Miracles

H. Narasimhaiah

Belief in miracles is widespread all over the world, in general, and in India in particular. Miracle is defined as a phenomenon which violates known laws of nature. Being a student of science I had my own doubts about the existence of such miracles even from my student days. I have openly advanced arguments against the existence of miracles through newspapers and the All India Radio for more than three decades. Miracles, superstitions and meaningless rituals have been constantly exercising my mind.

When I became the Vice-Chancellor of the Bangalore University it occurred to me that I should use this opportunity to set up a committee officially to investigate miracles. While we were formulating budget proposals in February 1976, we decided to constitute a committee known as "The Committee to Investigate Miracles and other Verifiable Superstitions" and earmarked Rs. 25,000 for that purpose. The following were the Members of the Committee:

1. Dr. H. Narasimhaiah — *Chairman*
   Vice-Chancellor,
   Bangalore University
2. Dr. A. R. Vasudeva Murthy — *Member*
   Professor of Chemistry,
   Indian Institute of Science
3. Prof. R. Narasimha, — *Member*
   Professor of Aeronautical
   Engineering, Indian Institute of Science
4. Dr. K. P. Sinha, — *Member*
   Professor of Physics,
   Indian Institute of Science

5. Prof. B. Kuppa Swamy — *Member*
   Former Professor of Psychology,
   Mysore University.
6. Dr (Mrs). Vinoda N Murthy — *Member*
   Professor of Psychology,
   National Institute of Mental
   Health and Neuro Sciences
7. Dr. (Mrs) Anupama Niranjana — *Member*
   Medical Practitioner
8. Dr. N. R. Narayan, — *Member*
   Surgeon.
9. Mr. B. Nilakantan — *Member*
   Retired Chief Engineer,
   Indian Telephone Industries
10. Prof. A. M. Dharmalingam — *Member*
    Professor of Law
11. Mr. S. Kendaganna Swamy — *Convener*
    Deputy Registrar,
    Bangalore University.

The Committee made abundantly clear that it was neither against God nor against any religion.

I convened a press conference in early March 1976 regarding the Budget proposals of the Bangalore University for 1976-77 and informed the press about the formation of such a Committee and also the Budget allotment of Rs. 25,000. Many newspapers did not understand the implications of the formation of such a Committee. One or two newspapers published the item a little briefly but prominently.

Since the area of investigation was very vast and mostly nebulous, we thought that in the first instance we should concentrate our attention on clear, well-defined and specific problems. Naturally, the abnormal phenomenon of materialisation of objects from nothing claimed priority. In this connection the names of four or five persons in the Karnataka State occurred to our minds. Shri Shiva Bala Yogi invited me to see him in his Ashrama in Bangalore immediately after the publication of the objectives of this Committee. I visited him along with two lecturers. During our discussions, the Swamiji made it clear that he does not create any object from nowhere. Two persons who were attributed with such powers, Sri Sai Shankar in Coorg and Sri Ganapathy Sachidananda Swamy near Mysore—

openly stated that they do not perform miracles. Meanwhile, I got an invitation from a 'teenage God' by name Sri Bala Shiva Yogi who suddenly made his appearance in Bangalore. While we were discussing,I could see the movement of the fingers and the fist under his ochre robe. In the midst of our discussion suddenly he pulled out his hand, made his closed fist to describe approximately a circle and gave me a small image and a 'rudrakshi'. I was not surprised. I expected some such performance. It was all clear to me. I felt he was yet a novice, an apprentice in the field. I thought he had still miles to go before he could master that art. But he was honest. He told me that he did not create the object, did not transfer it either. He would tell the truth only after we investigate Sri Satya Sai Baba.

The God Child that failed

Pandavapura is a tiny village near Mysore City. A seven year boy by name Sai Krishna living in Pandavapura had received wide media coverage regarding his alleged divine powers of materialising ash. Many prominent persons had visited the village. Even the Governor of Karnataka paid a visit to the village to witness the 'supernatural phenomenon'.

The University Committee decided to examine the claims attributed to Sai Krishna. A letter was written to the father of Sai Krishna, requesting his co-operation to investigate the boy, by the Committee. There was no reply. Reminders did not have any response. Later, through indirect sources we came to know that the members of the Committee could visit Pandavapura as devotees; but they would not be allowed to touch the boy or examine him in any other way. Three members of the Committee, Dr. (Mrs.) Vinoda N. Murthy, Prof. B. Kuppa Swamy and Dr. (Mrs.) Anupama Niranjana went to Pandavapura on Thursday 8th July, 1976 expecting to witness the miracle which used to happen only on Thursdays while conducting Bhajans (Prayers). The members of the Committee did not reveal their identity and sat among the other devotees. On that day there was no miracle.

On Thursday 15th July 1976 the same three members went there again *incognito*. The Bhajan ended. The sleeping boy woke up. There was no miracle. The congregation was about to disperse. Then Dr. (Mrs.) Vinoda N. Murthy noticed the boy was repeatedly putting his hands on his waist and appeared to be uncomfortable and also she saw a dangling string. Just out of curiosity and also of some

suspicion she pulled the string and 'Lo and Behold!' the hidden ash poured out from the underwear. There was a lot of commotion. The members of the Committee were abused and cursed. The mother of the boy said that they were all devotees of Sri Satya Sai Baba of Puttaparthi who was the main switch and Sai Krishna was only like a small bulb.

Thus the divine powers of Sai Krishna were exposed. It created a sensation. The press all over India gave a wide coverage to this exposure. The University Committee attained national importance. In fact that was the first Committee constituted by a university or any other official body in India and probably in the world for such a purpose.

Astrology

The Committee published a small book "Do planets have any effect on human beings ?" by Prof. N. K. Narasimha Murthy, a retired Professor of Mathematics, Mysore University. According to the book, the planets have no effect on human beings. This book has advanced rational arguments that astrology has no scientific basis. The publication of the book created understandably a lot of resentment and commotion among astrologers and other staunch believers in astrology.

The Committee also constituted sub-committees to investigate whether palmistry and water divining had any scientific basis.

Encounter with Sri Satya Sai Baba

After exposing Sai Krishna, naturally the attention of the Committee was directed towards Sri Satya Sai Baba who has been attributed with all kinds of paranormal powers such as materialisation of watches, idols, gold chains, converting water into petrol and curing many incurable diseases. He is considered to be a God or Godman by his ardent disciples. He is nationally and internationally known for his performing miracles. He is running, among many educational institutions, a College at Whitefield about eight miles away from Bangalore and he has also a place of residence there. He is having a large number of disciples many of them holding very high positions in public life. He has also a few well known scientists as his disciples. Hence it was but natural that the Committee should have focussed its attention on such a Godman.

The Chairman of the Committee wrote three letters to Sri Satya Sai Baba requesting his co-operation for conducting investigations on him using the methods of science under controlled conditions.

FIRST LETTER—UNDER CERTIFICATE OF POSTING

BANGALORE UNIVERSITY

No. VCP. 73/76
Dated 2nd June 1976.

'Jnana Bharathi', Bangalore-560 056,

To

Sri Satya Sai Baba,
Brindavan, Kadugodi Post,
White Field, BANGALORE DISTRICT.

Dear Swamiji,

As you know in our country quite a number of persons claim miraculous powers. It is also believed that some of them claim to create objects from nothing. I am sure you will agree with me that materialisation of objects from nowhere is a paranormal phenomenon defying all known laws of science. In fact all the discoveries and inventions in the field of science till now made all over the world pale into insignificance when compared to these phenomena. Many of us naturally have been bestowing serious thought on these supernatural phenomena. Besides, our country is steeped in many superstitions and we are very much concerned about their harmful effects on people.

Recently, the Bangalore University has constituted a Committee to investigate rationally and scientifically miracles and other verifiable superstitions. This investigation is not against God or religion.

I am sure you will agree with me that the members of the Committee are drawn from different fields and are highly competent to make such investigations so that people may know the truth about miracles and superstitions. Hence this investigation is nothing but *'Satyanveshana'* (Pursuit of truth).

We have heard a lot about your miraculous powers. In fact you are nationally and internationally known for being endowed with divine powers which have enabled you to perform many miraculous acts of which the most widely known is materialisation of objects from nothing. You are also known for propagating Dharma and you are known to place emphasis on truth. Hence, I will be very thankful to you if you can kindly give me and the other members of the Com-

mittee an opportunity to meet you and discuss with you all these issues and also to conduct the investigation of these phenomena according to well established methods of science under controlled conditions. I have no doubt at all that a person of your calibre, supposed to possess rare divine qualities, will extend your fullest cooperation in the name of Truth which is also sometimes equated to God so that we may conduct meaningful investigations which will be of enormous value to large sections of the public in our country and abroad.

I request you kindly to let me know the place, the date and time so that we may have the privilege and pleasure of meeting you.

Thanking you, with regards.

Yours sincerely,

(Sd) (H. NARASIMHAIAH)
Vice-Chancellor & Chairman,
Committee to Investigate Miracles & Superstitions.

SECOND LETTER—UNDER CERTIFICATE OF POSTING

No. VCP. 99/76 Dated: 16th June, 1976

Dear Swamiji,

I hope you are in receipt of my letter No.VCP. 73/76 dated 2nd June 1976, I am sorry to mention that no reply is received from you. I will be thankful to you if you can kindly reply to this letter at your earliest possible convenience letting us know the place, the date and the time so that we may meet you. For your ready reference a copy of the previous letter is enclosed.

Thanking you, with regards,

Yours sincerely,

(Sd) (H. NARASIMHAIAH)

THIRD LETTER—UNDER CERTIFICATE OF POSTING

No. VCP. 134/76 Dated: July 5, 1976

Dear Swamiji,

It is a matter of deep regret that my letter dated 2nd June 1976 remains unanswered. The reminder on 16th June 1976 has also not produced the desired effect.

The charisma that is built around you is on the belief that you can perform miracles. You know the moment your miracle is proved to be a myth you will become an ordinary person. Hence the best logical method that you seem to have adopted is to evade all attempts which will remove that halo. Some of the arguments advanced in support of your non-cooperation may be "How can such a great person, a divine person, God, subject himself to such investigations by earthly beings ? He is under no such obligation". Needless to say that these arguments are untenable.

A person should defend what he says and should explain what he does. This is the basic requirement expected of a gentleman.

It is not difficult to mislead or cheat large number of persons. But nobody can cheat his own conscience. You know this better. For all our actions the ever vigilant, the ever watching witness is our conscience. One should be true to one's own conscience. In fact, that should be the endeavour of all of us. The more divine a person is the more conscious he should be of the existence of conscience and the need for him to be faithful to it.

Great and divine people have always made it their life's mission to clarify what they have done and what they have said. Bhagavan Buddha, Swami Vivekananda and Mahatma Gandhi urged their followers to accept them only after test and verification. Their lives were open books. They did not consider any question to be too small. They answered all questions and demonstrated every action. They were humble, simple and lived in the midst of the poor and the downtrodden. Was there anything that these divine persons practised in secret ? Your way of life seems to be an exception to the life led not only by these great souls but also by the other truly religious and divine persons. Truth appears to have been sacrificed and you seem to have made secrecy your forte. All great and religious men have proclaimed that Truth is God and secrecy is sin.

It is unfortunate that in our country of hoary past that the gullibility of people who cannot face problems of life courageously and who blindly succumb to tricks and machinations is being continually exploited in the name of spirituality.

The purpose of this letter is not to malign you or to hurt your feelings. But at the same time, I feel it should be forceful enough so that you may appreciate the deep concern of the Bangalore University for the pursuit of Truth in such matters.

This is the last letter that I am writing to you in this series. If no reply is received before 19th July 1976 it will be presumed that you have nothing to say in this matter and I will be constrained to release these letters to the Press.

I hope even now you will exhibit moral courage to accede to my request.

Yours sincerely,
(Sd) (H. NARASIMHAIAH)

Release of the Letters to the Press

Since there was no response from him,the letters were released to the press.

Consequent on releasing the letters to the press there was widespread national debate in all newspapers, and periodicals. There was not a single newspaper which did not refer to this controversy. Many editors of prestigeous periodicals interviewed me and also Sri Satya Sai Baba. The statements and counterstatements were read by millions of people with great interest and avidity. Sri Satya Sai Baba in his statements and speeches poured contempt and venom on the Chairman of Committee, questioned his competence to investigate him and described him as a worthless insignificant worm incapable of comprehending his divine miraculous powers.

A function connected with Sri Satya Sai College of White Field was unusually held in Bangalore when the controversy was going on. From the proceedings it was obvious that the main purpose was to launch an offensive against the University Committee. Sri Sathya Sai Baba in his address bitterly attacked the University Committee. He called me and other members of the committee dogs and ants. He compared himself to a star and an unfathomable ocean. He made allegations against the University and asked us to mind our business. He declared no power on earth had the capacity to examine him.

Understanding the importance of this controversy, correspondents of newspapers and news magazines made pilgrimages to Puttaparthi to seek interviews which were granted by Sri Satya Sai Baba almost in no time. It was said previously on many occasions important persons had to wait at his doors for hours and days even to get his 'darshan' (interview). But then the situation had changed mark-

edly. Now it was Sri Satya Sai Baba's turn to wait eagerly and anxiously for the correspondents. He made a systematic and well planned campaign, through a section of the daily and weekly press by getting a series of articles written by his devotees and others, published. All these articles had extolled the divine qualities of Sri Satya Sai Baba, attributed all kinds of miraculous powers of converting water into petrol, curing incurable diseases, bringing the dead to life, materialisation of objects and many other equally fantastic phenomena and came to the firm and final conclusion that he was nothing but God, pure and unalloyed.

Further letters to Sri Satya Sai Baba

This debate continued for months. Another letter was addressed to Sri Satya Sai Baba inviting him to give a demonstration lecture—on 'Miracles' under the auspices of the Bangalore University. As before, there was no response.

Finally, the Committee decided to write to him informing him unilaterally that they would be meeting him on 29th May 1977 at 10 a.m. at his Whitefield residence. Consequently, all the members of the Committee along with the representative of the press went in a bus to meet him. The members of the Committee were warned by his local prominent devotees and other agents about the serious consequences of such a visit. The Committee ignored the warnings and reached the massive, heavily guarded portals of his abode and were prevented from entering the premises. We were told that he was inside the premises and we would not be allowed to enter. We returned disappointed.

Thus ended our tireless and continued efforts to meet Sri Satya Sai Baba and also to conduct investigations on him. But the controversy which raged for nearly eighteen months and the animated debate in which even illiterate people participated, created a very healthy impact on the thinking process of the people. It was a household talk for quite some time. It sowed seeds of doubt even among the close disciples of Sri Satya Sai Baba. Some of his well known disciples, notably Dr. S. Bhagavantham who was the Director of the Indian Institute of Science and former Secretary to the Defence Department, Government of India have deserted him. His influence has waned. He has almost stopped performing 'miracles'. He has receded to the background. After all, the efforts of the Committee were not in vain.

6

Sri Satya Sai Baba —and Scientific Attitude

H. Narasimhaiah

Many staunch disciples of Sri Satya Sai Baba consider him to be God which gives rise to serious doubts. If he is God why should he need a translator to translate his Telugu speech into other languages ? He can use the same divine powers to speak in any language with ease. Besides, God should be all knowing. But I am sure his knowledge of science as also many other subjects is less than that of a High School student. This 'God' is as ignorant as any person in many matters. We have not come across this 'God' using his powers to bring rain to drought stricken areas, to ward-off calamities, to bring succour to the poor by creating and distributing rice, wheat and other commodities. Who knows he may have his own difficulties !

After the exposures of Pandavapura myth and the publication of my letters, Sri Satya Sai Baba seems to be shaken, he appears to be in jitters. An objective examination of his speeches in the course of these two months reveals not only his perturbed state of mind but also statements which are in conflict with one another. He has unleashed terrific propaganda in his favour and has been pressing into service all means of support. It seems as though he is fighting for his survival. With him are his committed devotees to share his fate.

The problem before us is whether matter can be created from nothing. Such materialisation of objects is a paranormal phenomenon defying all known laws of science. All the discoveries and inventions made all over the world till today pale into insignificance when compared to this supernatural act. Hence, we wish to find out under controlled conditions whether this is possible or not. That is all. Such materialisation of an object, if true, is an experiment which

comes under the realm of science. We are not asking the explanation for this materialisation. That experimentation, if the act is true, may be beyond the sphere of science. We would like to see that experiment and get ourselves convinced. Earthly and mundane people like me may not understand the explanation and the process behind that 'mystic' phenomenon. That does not matter. But he should agree just to demonstrate that experiment openly. And he should not use disjointed phraseology, jumble of words, which are all irrelevant and tend to confuse the issue. Hence, there is no necessity to quote chapter and verse from books written by his devotees, no necessity for others to narrate their personal experience, no necessity to mystify the issue, absolutely no need to exhibit second hand and indirect evidence when a direct verification is possible if Sri Satya Sai Baba co-operates.

A number of doubts have been bothering me and many others about this phenomenon. Firstly, how is it that the size of the article which he 'creates' is always less than the size of his fist. Secondly, that the article of his 'creation' either a watch or a ring or something else had already existed in the world. It appears as though it is nothing but exhibition of existing articles. Hence my request to him has been to create a big sized article, say a pumpkin or a three-foot metal image. He should not exhibit an article he has or of his choice. He should 'create' an article of our choice. I feel that if a person is capable of creating a watch with many complicated components it should be easier for him to create a comparatively simple object like a pumpkin or any big sized article. Producing an article with his own mark does not prove that he has created an original article. Such an article can easily be got manufactured for this purpose. Besides, this 'creation' of certain articles involves moral and legal problems. 'Creation' of H.M.T. watches, if true, amounts to stealing the patent. 'Creation' of imported watches means evading customs and amounts to smuggling. 'Creation' of gold articles and not declaring gold violates Gold Control Order. These are major offences for which action can be taken against Sri Satya Sai Baba.

A close observation of Sri Satya Sai Baba and a careful analysis of his activities show that he has the same human anatomy, same daily cycle of habits, same likes and dislikes, strong and weak points, efficiency and inefficiency in managing institutions, same successess and bunglings in his actions and transactions, same loss of temper,

same habit of using foul languages at times, same reactions to situations, and same worries and anxieties, and the same limitations in knowledge as any other human being. The difference can only be one of degree. In all his traits which are publicly noticeable there is no imprint of God or any stamp of perfection. If a person is divine or spiritual it must be evident in every action however minute it may be. Divinity or spirituality must be a way of life.

This reminds me of spiritual giants like Bhagavan Buddha, Swami Vivekananda and Mahatma Gandhi. Their lives were open books and their abodes 'open houses'. Swami Vivekananda's living room was accessible to all. Mahatma Gandhi's cottage was as transparent as a glass and was almost a public place. Sky was the roof in the case of Bhagavan Buddha. They led very simple and austere lives. They answered all questions irrespective of who put those questions. They asked everybody not to follow them blindly. All their statements were tempered with scientific attitude. In fact Gandhiji called his autobiography, *The Story of my Experiments with Truth.* Sri Ramana Maharshi, the sage of Thiruvannamalai, was another great soul, commanding our respect. There are many others who are humble and rational trying to know the ultimate Truth.

In fact, it is the duty of Sri Satya Sai Baba to answer all questions, to defend all his statements, and to demonstrate openly all the divine powers attributed to him so that the doubters, be they biased or unbiased, may get satisfactory answers. This is a matter of public importance. In fact his duty is more to those who do not believe him than to the others who may have faith in him. Sri Sathya Sai Baba is fond of stating that he will give interviews to all those who come to him with love, faith, and without any bias. I wish to ask him whether all those persons who have met him previously and in recent weeks satisfy those conditions. Even a casual analysis of his devotees reveal that many among them are persons of questionable character, of corrupt practices, tax-dodgers and antisocial elements. It seems as though that the members of the University Committee seem to be unworthy of getting the interview. According to him we may not fit into his company. May be true!

To the question 'Are you God ?' Sri Satya Sai Baba is reported to have said 'God is in every body'. Having been a teacher for over twenty five years this answer in my opinion is impertinent. It is an attempt at evading the question. Sri Satya Sai Baba often complains

and bemoans that his critics have ignored his humanitarian and educational activities. I wish to submit that we are not discussing that aspect at all.

The spirit behind the problem that we have taken up for investigation is of great importance and of far-reaching consequences. There is nothing personal in this investigation. But it is against obscurantism, against a cult and an attitude. This is nothing but pursuit of truth *'Satyanveshana'*. In our country there are Gods galore, many Babas and 'mini' Babas. By applying the method of verification, method of questioning we should do our best to separate the counterfeit from the genuine, the fake from the true. This is highly necessary and desirable from the point of view of purifying the existing religious and spiritual field also. Besides, large scale exploitation has been going on for centuries in the name of God and religion. Poor and gullible people are continuously being cheated. Even some scientists are no exception in this age of science.

It is true, stupendous progress has been made in the field of science and technology. Scientist is on the verge of creating life in the laboratory. It is a tribute to the inquiring, restless, and undaunted spirit of man for having unravelled many a mystery of Nature. That which was considered supernatural yesterday has become perfectly natural today. This is one side of the picture.

The other side of the picture is depressing. A scientist or a student of science will be highly rational in his approach to problems inside the laboratory. But it is shocking to find many a time the same rational man being hopelessly irrational in trying to solve the problems of life. It seems as though his thinking faculty has taken a holiday! Even though man has reached moon thrice and returned triumphantly, still there are two theories for eclipses — one for teaching in the class room and the other to practise at home. We have many instances of a number of scientists having profound faith in palmistry and astrology. Some scientists blindly follow persons who are supposed to be endowed with the powers of performing miracles. What kind of scientific temper and rational outlook can be propagated by such persons for whom science is not a living faith but merely a means of livelihood.

Our country is saturated with superstitions. An educated superstitious person is more dangerous to the society than his uneducated counterpart. There is an urgent need for the educator to be properly

educated. All superstitions are born out of fear and ignorance. They do incalculable harm by damaging the self-confidence. They blunt the edge of dynamic thinking and fearlessness.

It is a matter of a regret that the attention and respect accorded to science is directed wholly to its results and its spirit is still unpopular. But I wish to say that it is in its spirit the chief value of science remains.

The methods of science are the best means to be used in understanding and solving problems even though there are gaps in our knowledge and limitations for science. No statement or saying, however ancient it might be and whoever might have said, should be accepted mechanically. They should be tested on the anvil of experiment wherever possible. In all investigations reason should be our forte. It is the duty of all institutions and universities to promote such an attitude. But many universities seem to have mostly forgotten the objectives as stated by Pandit Jawaharlal Nehru in his address at the special convocation of the Allahabad University when he said "A University stands for humanism, for tolerance, for reason, for the adventure of ideas and for the search of truth. It stands for the onward march of the human race towards even higher objectives. If the Universities discharge their duty adequately then they are well with the nation and the people."

As we know, the recently appointed Indian Constitution amending Committee has proposed ten fundamental duties of citizens to be included in the Constitution. The proposed eighth duty (fundamental) is to cultivate scientific temper, humanism, reason, spirit of inquiry and reform. If every one takes to this duty seriously and tries to translate it into action then it will have very welcome consequences. Incidentally, this also gives constitutional sanction to the investigations of this kind by universities and other educational institutions. Now coming back to the point, no hysterical outbursts, no publication of large number of articles, no exhibition of objects under doubtful conditions, and no crying from house tops, will prove that Sri Satya Sai Baba can materialise articles. All these cannot establish his divinity either. How long should this suspense go on? Thousands of persons have genuine doubts. It is high time that this riddle is settled once and for all. This national debate which has been going on should not be allowed to fizzle out. Something concrete should materialise from this great controversy. The problem is

clear and simple. It should not be made confusing by bringing in extraneous matters. There should be no dodging, no evasive replies, and no beating about the bush. I hope Sri Satya Sai Baba, if he is honest, will exhibit moral courage and agree to our request to discuss with him and to investigate his powers under controlled conditions to establish the veracity of his statements regarding materialisation of objects.

As a student of science even now I have an open mind in the sense that I am prepared to review my opinions and tentative conclusions in the light of new data and fresh experience.

(Summary of the article published in the *Illustrated Weekly of India*, October 31, 1976)

INTEGRITY IN THOUGHT

The adoption of rational conceptions of the nature of truth, and of corresponding attitude towards the various sources of knowledge, doesnot depend on the possession of exceptional brain power. The main element in rationality is a resolute and incorruptible integrity of mind which is the exact antithesis of "infidelity". Hence, its attainment lies well within the reach of the clean intention of the candid soul, while evading the grasp of the "powerful" but perverse intellect. When a man is possessed with this spirit he turns his face to the truth as a flower turns its petals to the light. The whole atmosphere and machinery of obscurantism become distasteful to him. Henceforth an unflinching rectitude in thought in the goal of his ambition.

* * * *

Just as in man's moral nature there is a constant struggle between the blind proclavities inherited from the brutes and the higher instincts which have been evolved in human society, so, in the sphere of intellect, there is a constant warfare between that inertia, that automatism, that spirit of routine which fetters our thought and makes us the slaves of custom and tradition, and that spirit of doubt, inquiry, and experiment which lies at the root of every kind of progress. We who believe in the supremacy of reason are deeply interested in the issue of this conflict, and we seek to throw our weight into the scale on the side of right and truth. This we endeavour to do by labouring to bring the new knowledge within the reach of all, by insisting on the incalculable value of right thinking to human society, and by holding up before the world, as far as in us lies, the ideal of a fearless and incorruptible integrity in thought.

— Thomas Paine

7

Science, Mysteries, and the Quest for Evidence

Martin Gardner

Parapsychologists and psi journalists are fond of an argument that goes like this: Orthodox science is making such colossal strides, putting forth such bizarre theories, that no one should hesitate to accept the reality of psi. It is a theme that pervades Arthur Koestler's influential *Roots of Coincidence*. As parapsychology becomes "more rigorous, more statistical," Koestler writes on the very first page, theoretical physics becomes

> more and more "occult," cheerfully breaking practically every previously sacrosanct "law of nature." Thus to some extent the accusation could even be reversed: parapsychology has laid itself open to the charge of scientific pedantry, quantum physics to the charge of leaning towards such "supernatural" concepts as negative mass and time flowing backwards.
>
> One might call this a negative sort of rapprochment—negative in the sense that the unthinkable phenomena of ESP appear somewhat less preposterous in the light of unthinkable propositions of physics.

It is true that modern science is making discoveries and formulating theories that contradict experience and boggle the mind, but this has always been the case. I suspect that most people are less boggled today by the wonders of science than they were boggled in the past by the notion that the earth rotates and goes around the sun. Indeed, all the evidence of the senses suggests that the earth is immovable and the heavens rotate. The centuries that elapsed before Copernican theory became entrenched in the common beliefs of the civilized world—including the beliefs of Catholics and Protestants, who fought the theory as long as they could—testify to the cultural shock of such a monumental paradigm shift, to use Thomas

Kuhn's fashionable phrase.

Today the public is much less bewildered by the paradoxes of relativity and QM (quantum mechanics), not just because it has grown accustomed to the surprises of science but because the paradoxes are too technical to understand. If a twin takes a long space trip at fast speeds and returns to earth, he will be younger than his stay-at-home twin. If he goes far enough and fast enough, he could return to find that centuries on earth had gone by. Most, nonphysicists, unless they read science fiction, have never heard of the paradox.

The same can be said of recent confirmations of the notorious EPR paradox that Einstein and two friends (E, P, and R are the initials of the three last names) devised to show that QM is incomplete. Two particles, separated by vast distances, can under certain circumstances remain "correlated" in the sense that, if one particle is measured for a property, the other is altered even though there is no known causal connection between the pair. Who is troubled by what Einstein called the "telepathy" of his paradox except physicists and philosophers of science?

The big bang, black holes, and other awesome aspects of modern cosmology have been dramatic enough to reach the general public, but I see no evidence that the public is disturbed. If *Time* reports that some physicists now think all particles are made of inconceivably tiny "superstrings," vibrating in spaces of ten dimensions, it is not likely to be a topic of cocktail-party chatter except in science circles. The only establishment claim now arousing strong public emotion is evolution, and that is because of the astonishing revival of Protestant fundamentalism.

From the beginning, science has been upsetting and drastically modifying history. It does not, however (as Koestler writes), progress by breaking sacrosanct laws. No laws of science are sacrosanct, and "breaking" is a poor word for the meandering process by which laws are refined. Great paradigm-shifts build on what went before. Ancient astronomers were good at predicting the motions of planets long before astronomy accepted a central sun. Let $1/c$, where c is the speed of light, reduce to 0 in the formulas of relativity, and you have Newton's formulas. Let Planck's constant equal 0, and QM becomes classical mechanics. The great revolutions of science are better described as benign evolutions. They refine what was known before by

placing that knowledge within new theoretical frames that have superior power to explain and predict.

There are other reasons that the progress of science is cumulative and increasingly rapid. Every decade the number of working scientists increases. In Galileo's day you could count the number of physicists on your fingers. Today tens of thousands of journals report the latest scientific discoveries and conjectures, many of the conjectures (as Koestler rightly perceived) more outlandish than the claims of parapsychology. Instruments of observation get better and better. Galileo's telescope was a child's toy. Microscopes using particles other than photons have greatly increased the range of observation of the small. Giant particle accelerators provide empirical underpinnings for strange new theories of matter that could not possibly have been devised even in Einstein's day. Space probes have disclosed more facts about the planets in the past 20 years than in the previous 200.

Koestler is right in one sense. The results of science should instill in all of us a strong awareness of how mysterious and complex nature is. In the words of J.B.S. Haldane, which occult journalists love to quote, the universe is queerer than we can suppose. Every scientist and every lay person should be open to any scientific claim no matter how preposterous it may seem. If it turns out that the human mind can view a remote scene by clairvoyance or influence a falling die or a random-number generator, this surely would be no more surprising than thousands of well-confirmed natural phenomena.

Does it follow from such admirable open-mindedness, from what the American philosopher Charles Pierce called the "fallibilism of science," that we should all accept the ability of psychics to bend paperclips with their psi powers? It no more follows than it follows from modern cosmology that (as Velikovsky maintained) the moon's craters are only a few thousand years old, or (as Jerry Falwell firmly believes) that the earth was created in six literal days and dinosaurs were beasts that perished in Naoh's flood.

We can now say what is wrong with Koestler's rhetoric. The extraordinary claims of modern science rest on extraordinary evidence. No physicist today would be bothered in the least by the seemingly paranormal aspect of the EPR paradox if it did not follow inescapably from firmly established laws of QM, and from carefully

controlled laboratory tests. But the extraordinary claims of parapsychology are *not* backed by extraordinary evidence.

For reasons that spiritualists have never been able to explain, the great mediums of the nineteenth century could perform their greatest miracles only in darkness. The equivalent of that darkness today is the darkness of statistics, and why psi phenomena flourish best in such darkness is equally hard to comprehend. If a mind can alter the statistical outcome of many tosses of heavy dice, why is it powerless to rotate a tiny arrow, magnetically suspended in a vacuum to eliminate friction? (J. B. Rhine's laboratory, by the way, made many unsuccessful experiments of just this sort, but they were never reported). The failure of such direct, unequivocal tests is in my opinion one of the great scandals of parapsychology.

Why is it that the most respectable evidence today for PK, the work of Helmut Schmidt and Robert Jahn, involves sophisticated statistical analyses of thousands of repeated events? The skeptic's answer is that, when a supposed PK effect is so weak that it can be detected only by statistics, many familiar sources of bias creep into the laboratory. In the case of S.G. Soal, once hailed as England's top parapsychologist, we now know that the bias was outright fraud. Even when researchers are totally honest, it is as difficult to control the effect of passionate desires on methods of getting and analyzing data as it is to keep sealed flasks free of bacterial contamination.

No skeptic known to me rules psi forces outside the bounds of the possible. They are merely waiting for evidence strong enough to justify such extraordinary claims. Their skepticism is not mollified when they find the raw data of sensational experiments sealed off from inspection by outsiders or when failures of replication by unbelievers are blamed on unconscious negative vibes.

I am convinced that today's skeptics would have not the slightest difficulty—I certainly would not—accepting ESP and PK the instant evidence accumulates that can be reliably replicated. Unfortunately, for 50 years parapsychology has rolled along the same murky road of statistical tests that can be repeated with positive results only by true believers. Psi forces have a curious habit of fading away when controls are tightened or when the experimenter is a skeptic—sometimes even when a skeptic is just there to observe.

Surely every parapsychologist worthy of respect now knows (even though he won't say so) that psychics are unable to bend

spoons, move compass arrows, or produce thought photographs if a magician is watching. As for the more responsible and more modest claims that rest on statistics, they are too often obtained solo or by a small band of researchers who will not let an outsider monitor what is going on. Raw data is often kept, as most of it is at SRI International, permanently under wraps.

Parapsychologists are forever accusing establishment psychologists of wearing blindfolds that make it impossible for them to see the results of the new Copernican revolution. If the results are as claimed, it is indeed a paradigm shift more sensational than most of the great shifts of the past, and Rhine deserves to rank with Copernicus, Newton, Einstein, and Bohr. Alas, the claims remain as poorly verified as nineteenth-century claims that character traits correlate with bumps on the head.

It would be good for every parapsychologist to study the history of phrenology. At one time, the number of scholarly journals devoted to this "science" far exceeded the number of journals that are today devoted to parapsychology; and, at one time, the number of distinguished scientists who believed that phrenology had been strongly confirmed far exceeded the number of distinguished psychologists today who believe that parapsychology has established the reality of the phonomena it studies.

(*The Skeptical Inquirer*—Vol. X, No. 4-Summer, 1986).

QUESTIONING MIND

The mind that questions and questions with a serious intent and purpose, and tests and verifies the answers it gets, has a dynamic quality about it which enables it to forge ahead in the world of thought and things.

— Swami Ranganathananda
'ETERNAL VALUES FOR A CHANGING SOCIETY'

8

The Perennial Fringe

Isaac Asimov

I doubt that any of us really expects to wipe out pseudoscientific beliefs. How can we when those beliefs warm and comfort human beings?

Do you enjoy the thought of dying, or of having someone you love die? Can you blame anyone for convincing himself that there is such a thing as life-everlasting and that he will see all those he loves in a state of perpetual bliss?

Do you feel comfortable with the daily uncertainties of life; with never knowing what the next moment will bring? Can you blame anyone for convincing himself he can forewarn and forearm himself against these uncertainties by seeing the future clearly through the configuration of planetary positions, or the fall of cards, or the pattern of tea-leaves, or the events in dreams?

Inspect every piece of pseudoscience and you will find a security blanket, a thumb to suck, a skirt to hold. What have we to offer in exchange? Uncertainty! Insecurity!

For those of us who live in a rational world, there is a certain strength in understanding; a glory and comfort in the effort to understand where the understanding does not as yet exist; a beauty even in the most stubborn unknown when it is at least recognized as an *honourable* foe of the thinking mechanism that goes on in three pounds of human brain, one that will gracefully yield to keen observation and subtle analysis, once the observation is keen enough and the analysis subtle enough.

Yet there is an odd paradox in all this that amuses me in a rather sardonic way.

We, the rationalists, would seem to be wedded to uncertainty. We know that the conclusions we come to, based, as they must be, on rational evidence, can never be more than tentative. The coming of new evidence, or of the recognition of a hidden fallacy in the old

evidence, may quite suddenly overthrow a long-held conclusion. Out it must go, however attached to it one may be.

That is because we have *one* certainty, and that rests not with any conclusion, however fundamental it must seem, but in the process whereby such conclusions are reached and, when necessary, changed. It is the scientific process that is certain, the rational view that is sure.

The fringers, however, cling to *conclusions* with bone-crushing strength. They have no evidence worthy of the name to support those conclusions, and no rational system for forming or changing them. The closest thing they have to a process of reaching conclusions is the acceptance of statements they consider authoritative. Therefore, having come to a belief, particularly a security-building belief, they have no other recourse but to retain it, come what may.

When we change a conclusion it is because we have built a better conclusion in its place, and we do so gladly—or possibly with resignation, if we are emotionally attached to the earlier view.

When the fringers are faced with the prospect of abandoning a belief they see that they have no way of fashioning a successor and, therefore, have nothing but vacuum to replace it with. Consequently, it is all but impossible for them to abandon that belief. If you try to point out that their belief goes against logic and reason, they refuse to listen and are quite likely to demand that you be silenced.

Failing any serviceable process of achieving useful conclusions, they turn to others in their perennial search for authoritative statements that alone can make them (temporarily) comfortable.

I am quite commonly asked a question like this: "Dr. Asimov, you are a scientist. Tell me what you think of the transmigration of souls?" Or of life after death, or of UFOs, or of astrology—anything you wish. What they want is for me to tell them that scientists have worked out a rationale for the belief and now know, and perhaps have always known, that there is some truth to it.

The temptation is great to say that, as a scientist, I am of the belief that what they are asking about is a crock of unmitigated nonsense—but that is just a matter of supplying them with another kind of authoritative statement, and one they won't under any circumstances accept. They will just grow hostile.

Instead, I invariably say, "I am afraid that I don't know of a single scrap of scientific evidence that supports the notion of trans-

migration of souls"—or whatever variety of fringe they are trying to sell.

This doesn't make them happy, but unless they can supply me with a piece of credible scientific evidence—which they never can—there is nothing more to do. And who knows, my remark might cause a little germ of doubt to grow in their minds, and there is nothing so dangerous to fringe beliefs as a bit of honest doubt.

Perhaps that is why the more "certain" a fringer is, the more angry he seems to get at any expression of an opposing view. The most deliriously certain fringers are, of course, the creationists, who presumably get the word straight from God by way of the Bible that creationism is correct. You can't get a more authoritative statement than that, can you?

I get furious letters from creationists occasionally, letters that are filled with opprobrious adjectives and violent accusations. The temptation is great to respond with something like this: "Surely my friend, you know that you are right and I am wrong, because God has told you so. Surely, you also know that you are going to heaven and I am going to hell, because God has told you that, too. Since I am going to hell, where I will suffer unimaginable torments through all of eternity, isn't it silly for you to call me bad names? How much can your fury add to the infinite punishment that is awaiting me? Or is it that you are just a little bit uncertain and think that God may be lying to you and you would feel better to apply a little torment of your own (just in case he *is* lying) by burning me at the stake, as you could have in the good old days when creationists controlled society?"

However, I never send such a letter. I merely grin and tear up the one I got.

But, then, is there nothing to fight? Do we simply shrug and say that the fringers will always be with us and we might just as well ignore them and simply go about our business?

No, of course not. There is always the new generation coming up. Every child, every new brain, is a possible field in which rationality can be made to grow. We must therefore present the view of reason, not out of a hope of reconstructing the deserts of ruined minds that have rusted shut, which is all but impossible—but to educate and train new and fertile minds.

Furthermore, we must fight any attempt on the part of the fringers and irrationalists to call to their side the force of the state. We

cannot be defeated by reason, and the fringers don't know how to use that weapon anyway; but we can be defeated (temporarily, at any rate) by the thumb-screw and the rack, or whatever the modern equivalents are.

That we must fight to the death.

(*The Skeptical Inquirer*—Vol. X. No. 3-Spring 1986).

PARAPSYCHOLOGY AND MODERN PHYSICS

Although the general public remains unaware of it, the overwhelming majority of experimental psychologists around the world do not believe that the existence of ESP and PK has ever been demonstrated. Yet for the past hundred years the true believers, inviolation of Sherlock Holmes's advice ("It is a capital mistake to theorize before one has data. Insensibly one begins to twist facts to suit theories, instead of theories to suit facts"), have been turning to the latest theories of physics in hopes of finding support for the shaky results they are convinced and genuine. It is a sad history. When Maxwell's theory of electromagnetic fields was new, it was fashionable to theorize about how magnetic forces could account for psi. When relativity theory was new, it was fashionable to explain psi by forces in hyperspace that move in and out of our world. Today the big mysteries of physics are on the microlevel. It is not surprising that true believers, eager to underpin psi with science, would turn to quantum mechanics. For once I find myself agreeing with J.B. Rhine. Paraphysicists would do well to abandon theory and concentrate on devising experiments that can be replicated by unbelievers.

— Martin Gardner.
"Parapsychology and Quantum Mechanics."

9

A Study of the Kirlian Effect

Arleen J. Watkins and William S. Bickel

An interesting photographic phenomenon called Kirlian photography can be demonstrated by applying a high-voltage (15,000-60,000 volts) high-frequency discharge across a grounded object placed on a sheet of film laying on the high-voltage plane. A typical configuration and one used for this study is illustrated in Figure 1. When the object placed on the film plane is grounded to complete the current loop, a discharge occurs between the object and the high-voltage conducting plane creating an air-glow discharge, which appears to the eye as a purple-blue fuzzy light called an aura. The aura is a very real physical phenomenon and can be recorded directly on photographic paper, on film (black and white or color), or on photo plates. When the plates are developed, the aura appears as a fuzzy glow around the boundary of the image.

Beginning in the 1970s, the origin of this aura image and its relevance to the state or condition of the object producing it became a topic of great popular interest. Claims were made that the aura of human objects—fingers, toes, etc.—contain information about the physiological, psychological, and psychic state of the individual. For plant and animal parts—leaves, stems, legs, wings, tissue, bone cross-sections, etc.—the aura was claimed to carry information about the "life-force," "life-energy," or "bioplasma" of the object. If the aura were indeed a probe for such conditions and carried information about important parameters inaccessible by, or more accurate than, other techniques, it would be a powerful and important technique for such studies.

Literature on Kirlian photography reports many studies by various people and groups. One universal and puzzling point is that it is often discussed with an air of mystery. It has been referred to as a new phenomenon, an unknown phenomenon, and a mysterious phenomenon carrying important information about life. For most

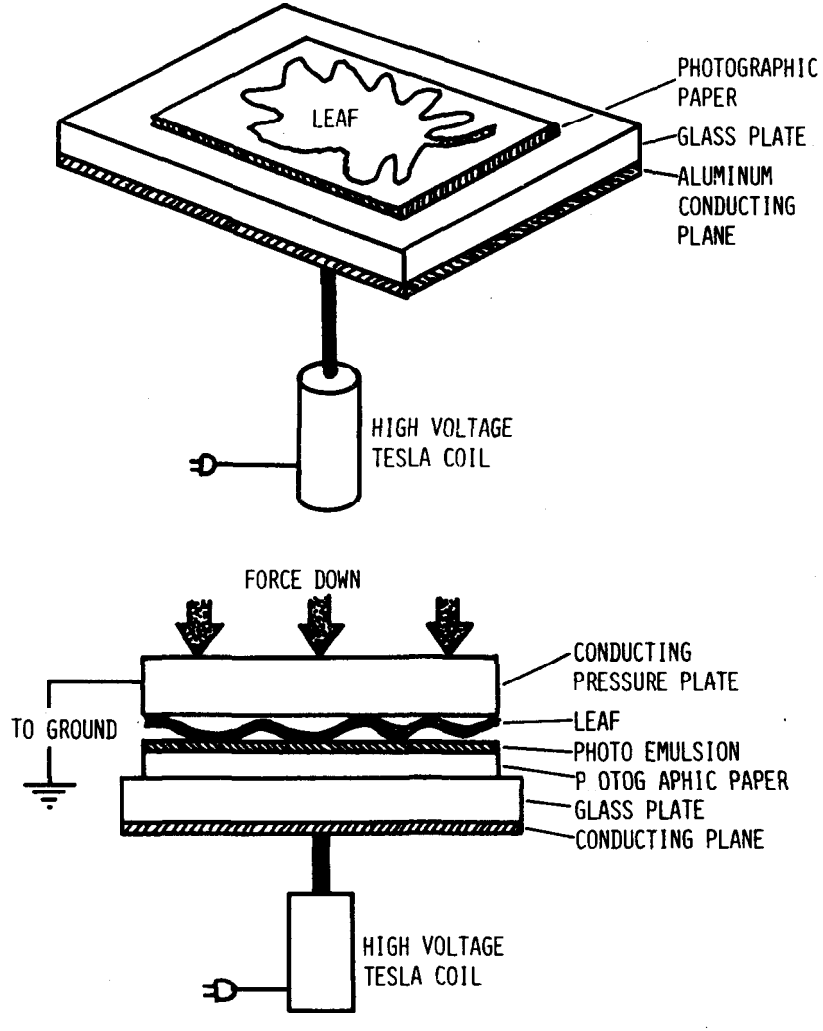

FIGURE 1. Arrangement of the high-voltage coil, glass plate, conducting plane, photographic paper, sample, and press for making Kirlian photographs.

physicists, the first guess is that the effect (the aura) is a corona discharge in air. If this is the case, the phenomenon, although it may be complicated to explain in detail, is well known and will be governed by the laws of physics. Therefore, any scientist setting out to investigate it will first document all observables relating to this phenomenon. Many serious studies have done exactly this. This was the motivation of this study, which we carried out with an apparatus we constructed to generate Kirlian photographs.

We took more than 500 Kirlian photographs to study the aura from three sets of objects with various configurations—animal, plant, and mechanical. Figure 2 displays some typical aura images. It is rather easy to recognize the objects used. The boundaries are quite distinct; the aura is rich in detail and shows much variation from object to object. We now discuss specific aura patterns to substantiate or refute certain claims and interpretations made by Kirlian investigators.

Claim 1

The aura is related to the "life-energy" or "bioplasma" of the animal or plant. The shape, size, intensity, and structure of the aura depend on the psychic energy, state of mind, emotion, well-being, illness, etc., of the object. Figure 3 shows a set of aura pictures of three different individuals. Figure 4 shows the aura of mechanical objects—coins, wire, water, gears, and sharp metal points.

Question: If the aura is due to the "bioplasma" or "photo energy" of the living object, then why does it appear from mechanical objects?

Answer: Since the aura appears from dead and organic objects as well as living or once living objects, the aura does not represent a "bioplasma".

Claim 2

The aura is supposed to represent the condition of the object via its size, shape, intensity, and structure. Figure 5, a, b, c show three sets of finger auras, from three different people. Each set was taken within a period of 15 seconds. Note that the aura varies from finger to finger in each set and very markedly in set 5c.

Question: If the aura represents the condition of the object, what interpretation do we give for the markedly different patterns?

Answer: For this set, none. We do not suspect at this point that the change in aura from one print to the next in any strip represents a

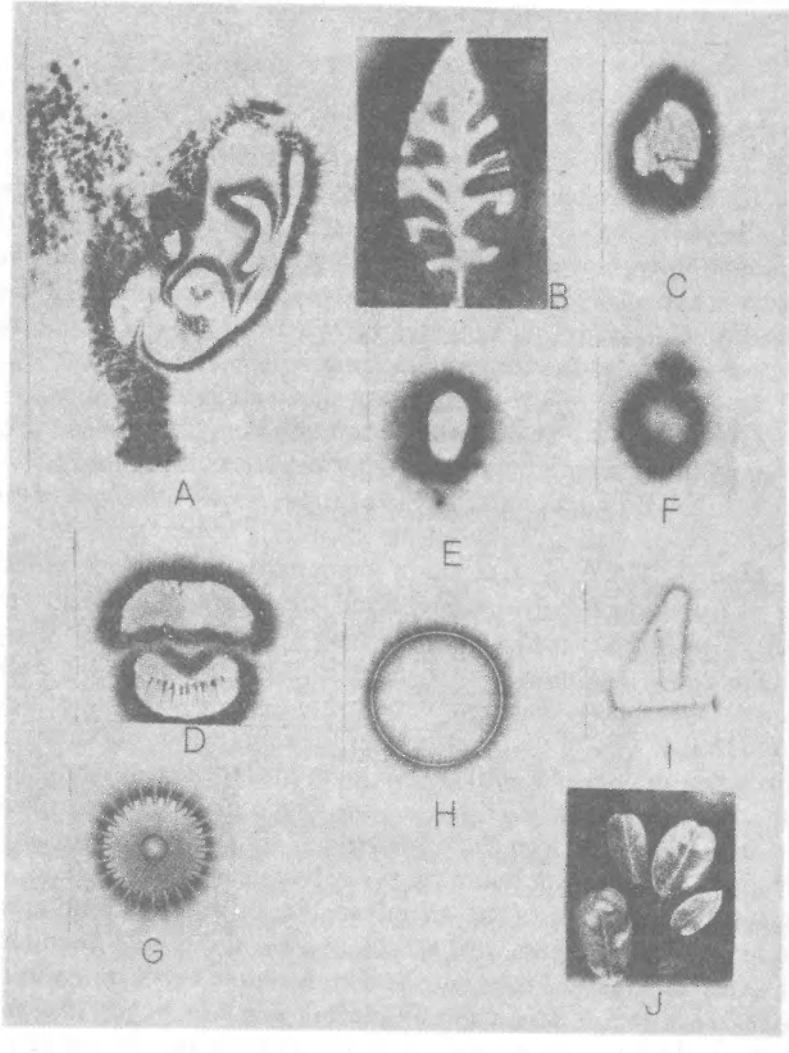

FIGURE 2. Kirlian photographs: (1) ear, (b) leaf, (c) thumb, (d) lips, (e) finger, (f) diamond ring, (g) brass gear, (h) metal ring, (i) paper clip, (j) leaves.

change in mental or physical conditions or personality of the individual. We suspect instead the cause of the differences is due to lack of experimental control, which will be discussed in detail in the last section.

Claim 3

When two fingers of two *different* people are placed side by side simultaneously, the aura pattern shown in Figure 6 results. Note the combined aura shows a sharp boundary between the two images. This is said to be due to the incompatibility of the two individuals; and the sharpness of the boundary, a measure of the degree of incompatibility. However, Figure 6b shows an aura created by two fingers of the *same person* simultaneously, 6d and 6f the aura of two pennies, 6e of a dime and a quarter, 6g of a metal bar and a dime, 6c of three fingers of the same hand simultaneously.

In *all* cases a sharp boundary occurs between the auras.

Question: If the sharpness of the boundary is an indicator of incompatibility, what interpretation do we give for the sharp boundary between the auras created by two fingers on the *same hand* of the *same person,* as well as between metal objects?

Answer: The interpretation of incompatibility is wrong unless two or three fingers on the *same* hand are incompatible with one another, or a dime is incompatible with a quarter, etc. The sharp boundary and its shape is easily explained in all cases using well-known physics laws. The boundary where no aura occurs is caused by the lack of electron motion in the film plane. Since both objects are at equipotential and both seek to neutralize the surrounding film plane, an area somewhere between the two objects will be at zero potential, i.e., an electron there is attracted with equal force in both directions. Therefore, it doesn't move. There is no electron flow, no current, no excitation of the air molecules, and therefore no aura. These physics principles also exactly explain the curved boundary of Figures 6e and 6g. Figure 6h shows the aura of two "compatible" fingers. However, it was made by placing first one finger, *then* the other, on the photographic paper. Since the images are not made simultaneously, the electrons can flow into the other image area, causing an aura there.

Claim 4

When Kirlian photographs are taken with color film, in addition to the size, intensity, structure, and shape of the aura, we obtain

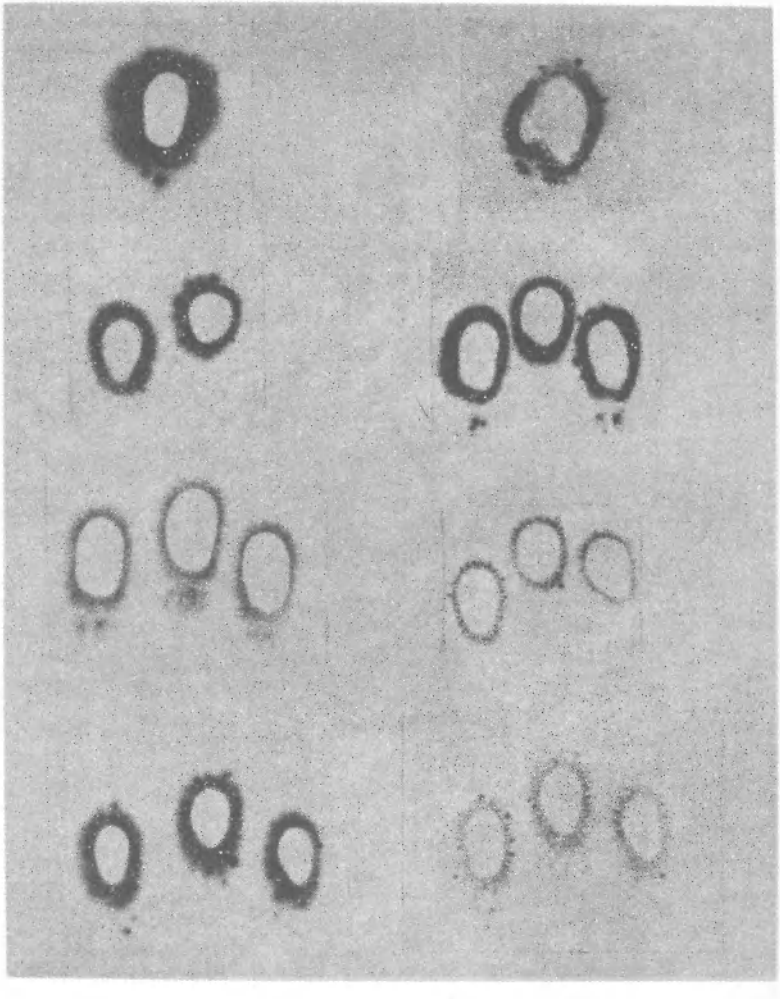

FIGURE 3. Assorted auras of thumb and finger prints of different people using different photographic paper, exposure and development times.

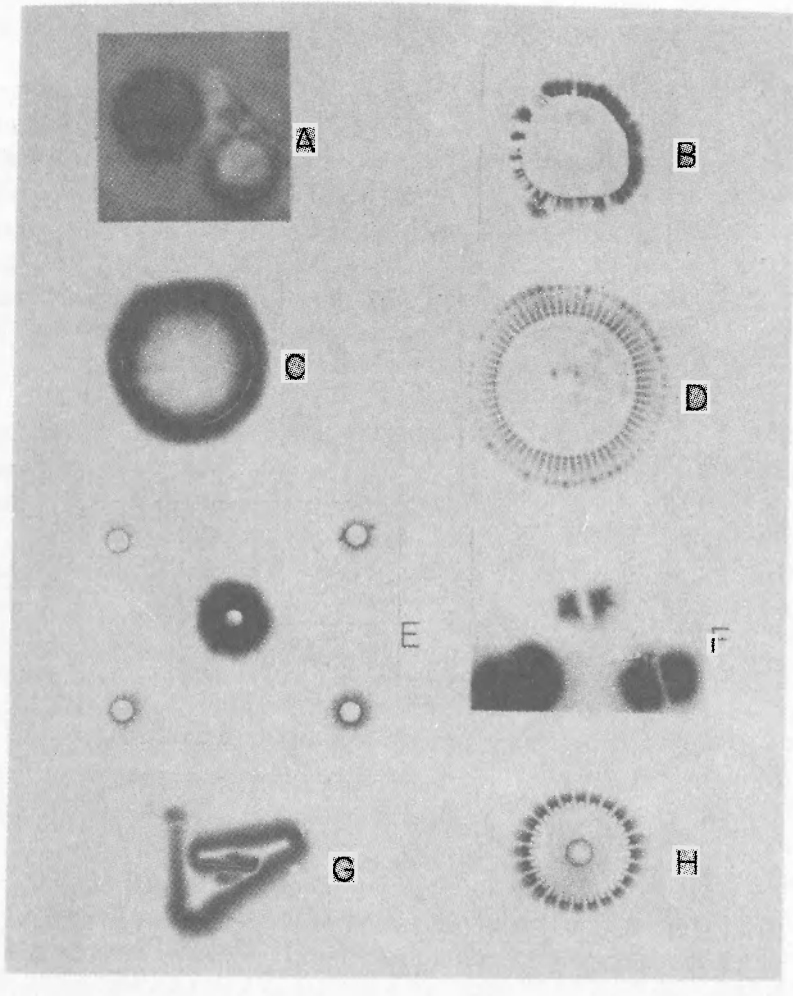

FIGURE 4. Assorted auras of mechanical objects: (1) penny ring, (b) water droplet, (c) ring, (d) brass spur gear, (e) small metal discs, (f) sharp point pairs, (g) paper clip, (h) brass gear.

the new parameters of color and color distribution. Color photographs of auras are very dramatic, showing a rich color distribution, which is claimed to contain information about the emotions of the subject—red = anger, strong emotion; blue = coolness and composure; etc. Although no color photography was done in this study, an examination of many color slides from a previous study brings up the same questions as the black and white pictures do *and more.*

Question: Are emotion and personality related to the color distribution of the aura?

Answer: Until proper controls show that the color photograph contains information *in addition to* what can be explained by laws of physics and the photographic process, this question cannot be answered. (Color emulsions contain three color dyes with different sensitivities to photon and electron stimulation.)

Claim 5

The aura of leaves and stems shown in Figure 7 is very rich in detail. As with finger auras, there is a large difference in aura patterns even though they are of the same leaf. There is a rather remarkable claim that one can get an aura pattern of an entire leaf even though part of the leaf has been torn or cut away or otherwise removed. This is called the "phantom-leaf effect". It is evidently difficult to reproduce but has been reported by several investigators and recorded on movie film. (There is also a "phantom salamander-tail effect.") None of our photographs demonstrated the phantom-leaf effect. Figure 8 shows the aura of torn and cut leaves. In no case was an aura detected in the region of the missing leaf or around its boundary.

Question: Is the "phantom-leaf effect" due to the bioplasmic body of the leaf?

Answer: The several cases we investigated where a phantom-leaf effect seemed to occur were *artifacts* and quite easy to explain. When a whole leaf is pressed against the film plane with a metal plate, moisture, dust, and a minute amount of juices are squeezed from the leaf, leaving an image. Sometimes this image could even be seen with the eye. When the whole leaf was removed and the metal plate returned to its original position, the new photograph showed a weak, fuzzy, ill-defined, and "mysterious" shape of the missing leaf. Figure 9b. shows the aura of the entirely missing leaf shown in 9a. This image, however, is totally an artifact.

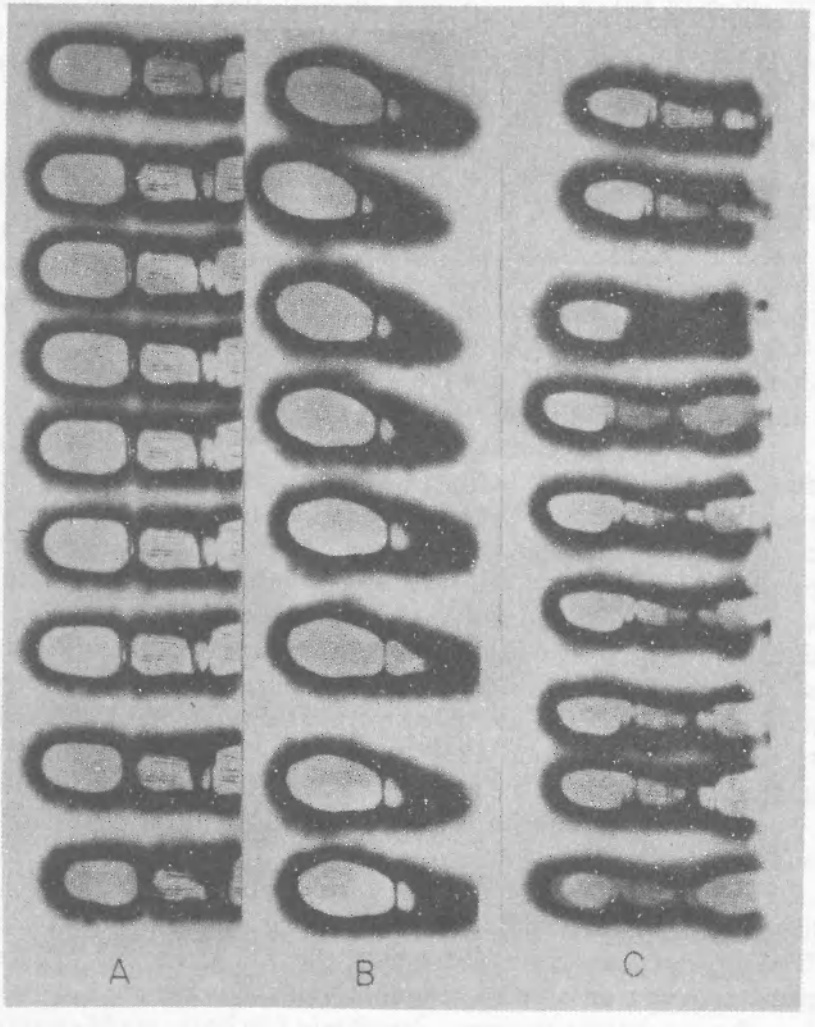

FIGURE 5. Aura of three sets of fingers from three different people.

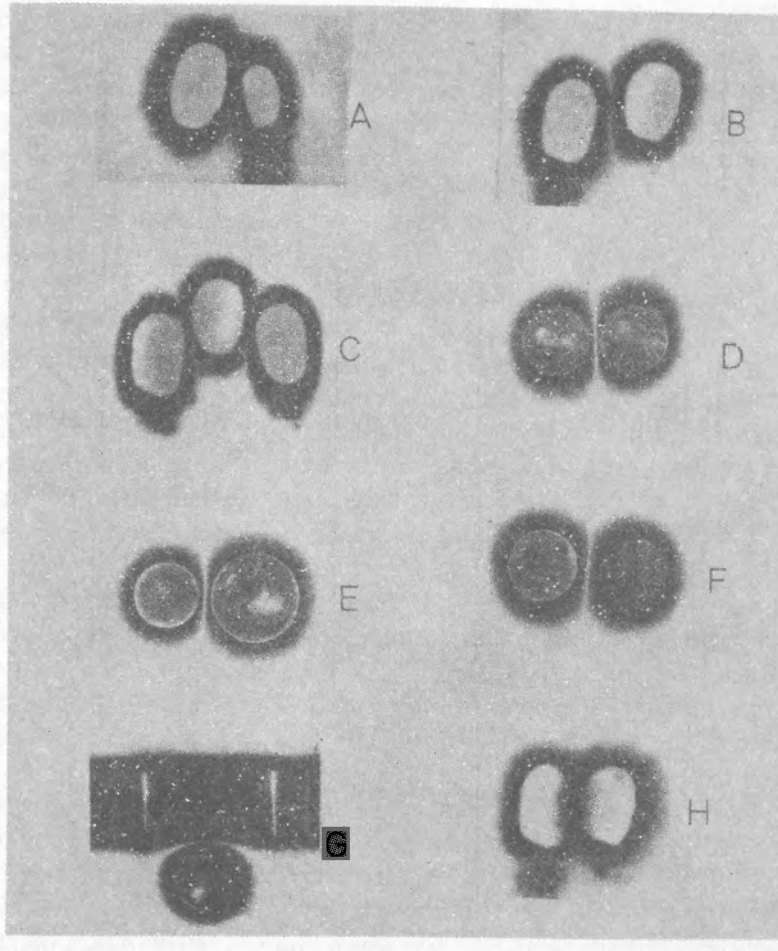

FIGURE 6. Aura pairs showing equipotential boundary between aura patterns: (a) fingers of two different people, (b) and (c) fingers of the same person, (d) and (f) two pennies, (e) penny and quarter, (g) dime and metal bar, (h) aura pattern of two fingers of same person not taken simultaneously.

The Kirlian Technique: Parameters Involved and Controls Needed

Although Kirlian photographs are very easy to make—needing a minimum of talent, equipment, and money, the entire Kirlian process from sample preparation to photo interpretation involves very many parameters and a very complex interplay between parameters and conditions. The following list contains 22 of the many parameters that must be controlled. Some of the more crucial ones will be discussed in detail. The parameters can be grouped into the following areas: (a) electronic and mechanical configuration, (b) sample and environment, (c) film, plates, and photographic process, (d) photographic image interpretations.

(A) *Electronic and Mechanical:* (1) Voltage discharge. (2) Current in discharge. (3) Current density through sample. (4) Frequency of the discharge (pulses per second). (5) Pulse shape. (6) Total resistance in circuit consisting of the air, emulsion, and sample. (7) Electric field configuration; point-plane, high-voltage plane, shape (square, rectangular, circular), grounding plane shape. (8) Sample holder and pressures used, size, shape and electrical characteristics of the press used to flatten sample against film plane.

(B) *Sample and Environment:* (1) Size, shape, and surface regularity of sample. (2) Conductivity (moisture content), salt or other local chemicals. (3) Surrounding atmosphere: *(a)* atmospheric pressure, *(b)* humidity, *(c)* temperature, *(d)* chemical content. (4) Complete history of the sample. (5) Cleanliness—lack of dust, specks, stains, moisture.

(C) *Films, Plates and Photographic Process:* (1) Film and paper type, ASA, RMS granuality, H-D characteristics, and *all* other film properties. (2) Emulsion properties—dielectric constant and conductance sensitivity to electron excitation, contact pressures (these are not usually published data). (3) Exposure time—continuous, pulsed, long, short, over-exposed. (4) Development—time, temperature, and chemicals used. (5) Reproduction of negatives—magnification, types of paper used (all paper characteristics). (6) For color photographs, peak wavelength sensitivity of dyes and sensitivity to pressure, electrons, and temperature.

(D) *Photographic Image Interpretation:* (1) Qualitative—comparisons, relative intensity, shapes, size and structure of aura usually made by the eye. (2) Qualitative—microdensitometer studies of intensities

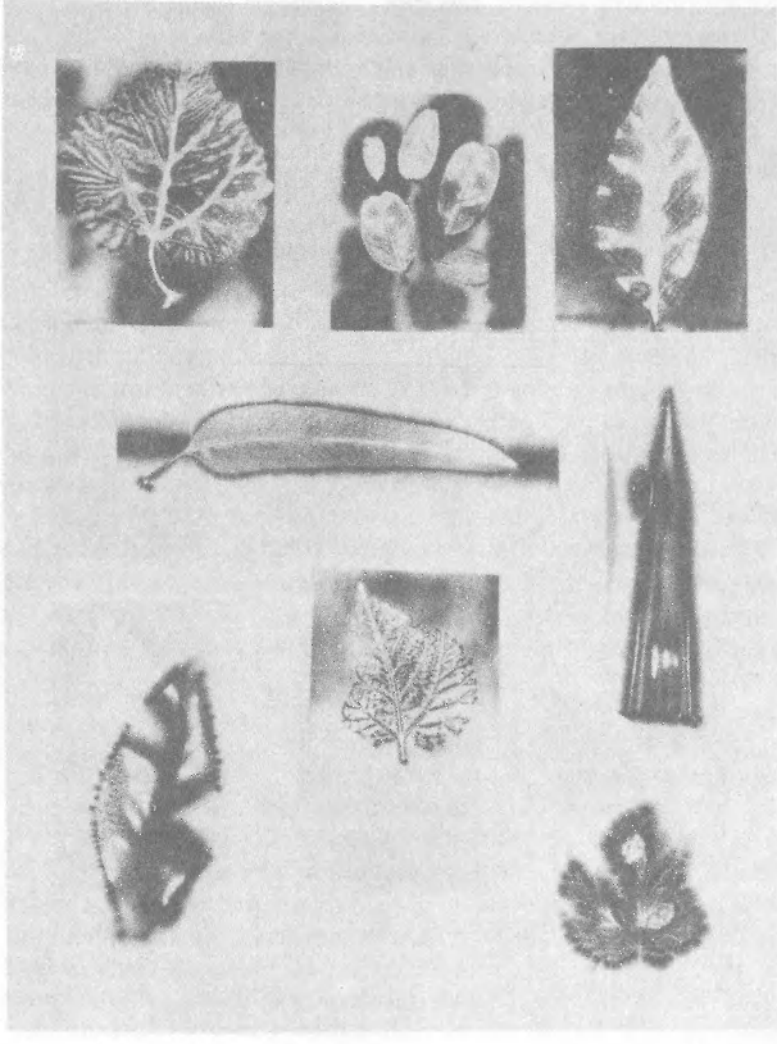

FIGURE 7. Aura of various leaves.

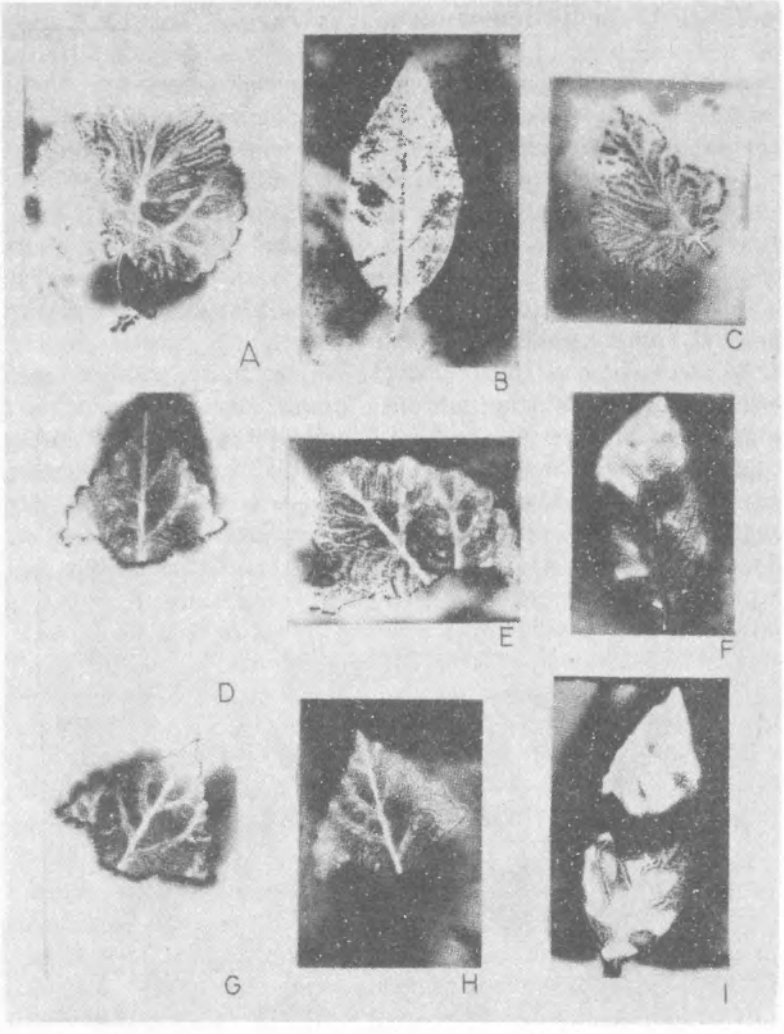

FIGURE 8. Aura of whole and broken leaves: (a), (b), and (c) whole leaves; (d), (e), (g), and (h) broken leaf with one piece missing; (f) and (i) broken leaf with broken sections separated.

recorded on *calibrated* plates. (3) Color—spectral studies of radiation emitted and of images formed according to quantitative color theory.

In the set of experiments reported here we found lack of control of the pressure on the sample, exposure time, development time, sample structure and preparation, and applied voltage caused the greatest variations in aura for the *same* sample. Indeed, even in cases where the aura was recorded under "identical" conditions, for the same object, the aura had significant variations in its properties. Of course a "significant variation" is a qualitative, subjective opinion.

Conclusions from these Experiments

In this rather short scientific investigation of the Kirlian technique, we were able to turn up a number of artifacts and puzzling signals that after a little thought and study were found to fit into the normal scheme of things. Moist fingers, varying pressures, different paper sensitivity, exposure and development times were responsible for most of the variations in the auras. *We conclude there is no need to evoke psychic phenomena to explain results and there is no evidence that psychic conditions affect the aura patterns.*

There is no reason to relate the aura to a "bioplasma." The body of course does radiate in the infrared. (It is a black body at 98.6° F.) The Kirlian aura is a visual or photographic image of a corona discharge in a gas, in most cases the ambient air. Its color depends on the composition of the air, pressure, and impurities emanating from the sample as well as the voltage and current of the source. Other gases, such as nitrogen, helium, argon, and carbon dioxide, that we have used also produce aura, but with color differences and shapes that depend on the spectroscopic and electrical properties of the particular gas. (Caution! In no case should hydrogen be used. It is extremely explosive when mixed with air and ignites with a spark. Remember the Hindenburg!)

The discharge ionizes and excites the molecules and atoms in the air, causing light to be emitted. The radiation emitted from excited gases in virtually all physical conditions has been extensively studied by spectroscopists since the early 1800s. The shape, size, intensity, and fine structure of the aura depends on exposure times, conductivities, pulse rates, voltages, and photographic properties of the plates and film used. When there is no applied voltage, there is no discharge. Then there is no aura because there is no light.

There is no evidence as yet that any *feature character* or *property of* the aura pattern is related to the physiological, psychological, or psychic condition of the sample. Although the aura surely depends on some physical properties of the system—i.e., the conductivity of the sample (sweaty fingers, perspiring hands), force exerted on the sample—it also depends on many other complicated effects. There is no doubt that some psychological and physiological conditions do manifest themselves in external signals; lie-detectors can work, heat sensors can detect tumors, shaking hands represent nervousness or illness, and so on. However, the Kirlian technique has not yet been shown to be a direct or meaningful link to these conditions. In fact, while most Kirlian investigators acknowledge the effects of the physical parameters, they make no attempt to standardize their research by controlling the parameters, nor do they appear to be concerned with the significance of changing parameters. Indeed, for the most part, the parameters within their research are only vaguely reported if at all, making replication studies by other researchers impossible.

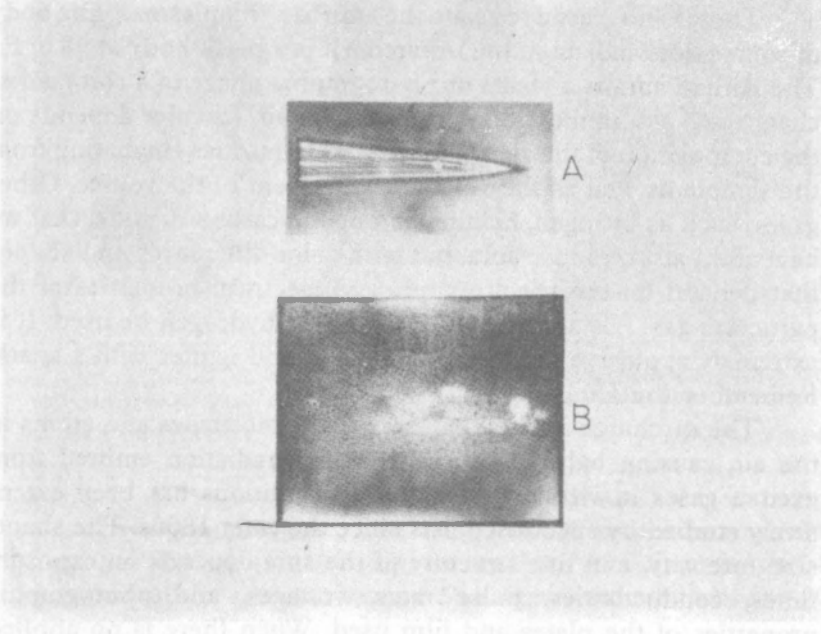

FIGURE 9. "Phantom Leaf Effect": (a) entire leaf aura, (b) aura of image of missing leaf shown in (a).

The difficult and pressing challenge then would be to control the parameters and demonstrate in several specific cases that the aura produces information inaccessible to, or better than, other techniques. Its usefulness then would not need to be advertised; it would be picked up immediately by all laboratories that can use it to extend their research into new directions. Within two months after Roentgen discovered X-rays, his device was used by doctors to examine bones.

The Kirlian aura will most likely remain a fascination to *non-scientific* people because of the ease in producing the aura and its "mysterious manifestations" of sparks, discharges, corona, and aura coupled with the words "life force," "photic energy," "bioplasma," "life energy," and so on. Most Kirlian claims will come from "experimenters" who will combine the complicated effects of gaseous discharges with samples having complicated structure and electrical properties, and film recordings involving complicated photographic processes and interpretations based on ignorance of the phenomena and the need for proper controls.

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THE ROYAL SOCIETY SPEAKS OUT AGAINST PSEUDOSCIENCE

The Royal Society, Britain's premier scientific body, has issued a report calling for bolstered efforts to increase the public's understanding of science. Among the many reasons was to help resist pseudoscience: "Greater familiarity with the nature and the findings of science will also help the individual to resist pseudoscientific information. An uninformed public is very vulnerable to misleading ideas on, for example, diet or alternative medicine. An enhanced ability to sift the plausible from the implausible should be one of the benefits from better public understanding of science."

10

An Investigation of Firewalking

Bernard J. Leikind and William J. McCarthy

For centuries, some people in various cultures around the world have walked on hot coals without getting burned. Ordinarily, this is associated with religious rituals, and success is attributed to spiritual or mystical powers protecting the walkers. Since firewalking is usually done in faraway places, many Americans are quite willing to give some credence to the firewalkers' claims that some sort of mysterious powers protect the walkers from harm—powers that can only be harnessed after long study and careful preparation. In the past year or so, many Americans have been walking across beds of hot embers as part of self-help seminars that purport to teach students to overcome fears or to take command of their lives and achieve success. Because firewalking seems so mysterious, if not impossible, to most of us, the firewalk serves as a powerful persuasive tool, convincing the walker that all of the material taught in the seminar must be correct.

We have investigated American firewalking in Los Angeles as taught and practiced by Tony Robbins of the Robbins Research Institute. We participated in a firewalk in the fall of 1984. One of us (WJM) attended the seminar, and the other (BJL) did not, since he wished to test the proposition that the training offered in the seminar was not necessary in order to walk across the coals.

How the Investigation Began?

One morning in April 1984, I (BJL) read an article in the *Los Angeles Times* headlined "Firewalking, The Curious Hot Foot It to a New Fad" (Krier 1984). It received a big play, beginning on page 1, continuing on page 3 for another half-page, and including three large photographs, one of which showed a rugged fellow in a dark suit striding boldly across a bed of glowing embers.

The article was filled with statements by the firewalk leaders, like this one by Tolly Burkan, once professionally known as Tolly

the Clown and now one of the nation's most renowned gurus of firewalking: "Just holding the thought in your mind that you're not going to injure your feet alters the chemistry of your body," he insisted. "Indeed, at many firewalking rituals throughout the world, belief is reportedly all that is needed."

Throughout the article, the consensus of the firewalkers was that in some way special mental powers altered the operation of normal physical processes. As it happened, I had read an article that dealt with firewalking in *Scientific American's* "Amateur Scientist" column (Walker 1977). In fact, I had seen the article's author, Professor Jearl Walker of Cleveland State University, dip his fingers into molten lead, and I knew that he had walked on hot coals in his classes. Professor Walker attributed this ability to the Leidenfrost effect: the presence of a thin layer of water vapor—a poor heat conductor—from moisture on the feet, either from sweat or from damp material around the coals.

So I thought I knew how firewalking was done, and I certainly believed it had nothing to do with the kind of exotic powers claimed in the *Los Angeles Times* article. I called the reporter and was told to write a letter to the editor. I called a skeptical medical doctor who had been quoted in the article, and he began referring reporters who called him about firewalking to me.

Sometime later, one of the principal firewalkers, Tony Robbins, was interviewed on a local call-in radio show. When I heard about this show I called the station to see if I could get a tape of the program. Bill Jenkins, the interviewer, had firewalked and was a believer in the mysterious mental powers of firewalkers. When I told him what I thought, he was quite upset and maintained that water wasn't necessary. He challenged me to go to a seminar to see for myself. I accepted.

So it was that one evening in November 1984 my psychologist friend, Bill, and I drove up into the San Gabriel Mountain foothills above Burbank to attend as guests a firewalking seminar run by the Tony Robbins group.

I was plenty nervous. I had been going around telling everyone that I knew how it was done and that I could do it without the training. I was thinking, however, that I might get burned. I wasn't sure which would hurt more, red, burned feet or a red, embarrassed face. I had taken the precaution of calling my doctor to get some advice on

first aid in case I needed it. He said that it wouldn't be too smart to burn my feet, even in the name of science, and said that not to do it would be the best first aid. Bill, on the other hand, intended to attend the training but not to walk—friendship only goes so far. So he was feeling pretty chipper.

What Happened at the Seminar?

While Bernie was feeling anxious about walking on hot coals, I (WJM) felt mostly the excitement of anticipation of a new adventure. I wasn't in any danger of burning my feet, since I wasn't going to walk. I was just going to look and learn. What kind of people would pay $125 for the privilege of risking their soles? What would the training be like? Could people really walk on hot coals without hurting themselves? Did Bernie know what he was talking about? Would I have to drive his car home for him?

The flyers advertising the firewalking experience and several other seminars claimed participation in these meetings could help people overcome lifelong fears like claustrophobia, eliminate lifelong addictions like smoking and overeating, and cure people of impotence and chronic depression—all within one or two hours. They could, it was said, help students study more effectively and train people to know, instantly, the most effective ways to communicate with and persuade people. The flyer promised to increase people's confidence in their ability to accomplish any important goal and to overcome past failures and succeed at seemingly impossible tasks. The proof of these new abilities was to walk on fire. Thousands of people had already succeeded.

The audience of about 80 people was middle class, with an average age of about 35 and a fairly even split between men and women. The vast majority of the participants were white and somewhat formally dressed. They seemed nervously gregarious, the way a class buzzes with conversation before a midterm examination. Among those I talked to were lawyers, doctors, secretaries, and advertising consultants.

The seminar took place in a hotel conference-room, with folding chairs placed in a semicircle around a temporary stage. There was a sophisticated sound system and contemporary upbeat music.

Tony Robbins is a tall, powerfully built man with a lot of energy and a pleasant, forceful personality. He led the training for the entire six hours and was assisted by a small army of volunteers and staff

members. Perhaps as many as one-fifth of the audience had attended the seminar before and were there for a refresher course.

Robbins told the audience they were "kindred" souls. He assured them that they could be as successful as he was simply by following the advice he was to give that night.

He warned against defeatist thinking, saying that fear of failure wipes out initiative and stops action. He claimed that stupid people can be successes while presumably smart ones may not be, that some stupid people may persist in the face of disappointment while the smart ones say it can't be done.

After about an hour, all 80 of us, clapping rhythmically and chanting, "Yes, yes, yes," filed out of the room and down to the parking lot to view the fires we would soon be walking on. The "yes" we chanted was the wishful answer to the question in all of our minds, "Can I walk the coals and not get burned?" The crowd of clapping participants encircled a bed of fresh sod in the middle of the parking lot. On the bed there were two bonfires of furiously crackling wood. The heat seemed particularly intense in the cold November night air. Robbins exhorted us to close our eyes and imagine ourselves conducting a successful firewalk. "What are you going to do," he asked "when you have achieved success ? You're going to celebrate !" He suggested we imagine we had just completed a successful fire walk, make a fist in the air, and shout with the elation we would feel upon achieving such a singular success. For several minutes, seemingly frenzied students shook their fists at the night sky and shouted "Yay !" "I did it !" and "Yahoo !" The din may have struck other hotel residents as yet more evidence that the strange things they had heard about California were true.

We returned to the seminar room where Robbins had presented himself as a "model" for us to emulate. He repeatedly told us that he was no different from us that he had suffered the same anxieties and fears we were suffering, and that he nevertheless had succeeded in walking on coals many, many times without getting burned. He also encouraged all of us to think of past successes and to remind ourselves of all of our "untapped" power.

He said, "We're all masters" and our fears are often groundless and should be ignored. He listed five steps to get rid of any fear: identify it, analyze it to death, be willing to accept the worst, be willing to accept the best, and then take action.

Halfway through the seminar, Robbins began describing neurolinguistic programming, a technique he claimed could enable its practitioners to cure people of tumors and long-standing psychological problems in a fraction of the time required by conventional treatments. He claimed that neurolinguistic programming enabled him to read people's motives like an open book. Neurolingusitic programming gave him such power, he said, that he could, without touching her, make a woman have an orgasm involuntarily. He claimed that he had cured a man of impotence and a long-standing drug-addiction in 90 minutes and that he could bring a person who was brain-dead back to life.

Meanwhile, Bernie was waiting anxiously down by the conflagrations. He chatted with the attendants and measured the temperature with a pyrometer he had brought with him. The fires were hot, 1,500°F to 1,800° F. He was sweating. Then, back in the lobby, he was nervously thumbing through Kittel's textbook, *Thermal Physics*. "Perhaps," he told me later, "I missed something doing a crossword puzzle in class when I should have been taking notes."

Finally, at about 1:00 A.M., the seminar reached its climax. Robbins gave us pointers about walking on coals. He said we could end up with stumps for legs if we didn't follow instructions. We were to walk, not run, breathe fully and deeply, stand very erect, look up at the sky, visualize a cool place, and chant, "Cool moss, cool moss," as we walked. At the end, we were to quickly and carefully wipe our feet and then celebrate our success.

We took off our shoes and socks, turned up our pant-cuffs, and filed on down to the parking lot chanting, "Yes, yes." Workers were taking apart the bonfires with shovels and spreading burning coals into thin beds 8 or 10 feet long. The heat was powerful enough to force us to close our eyes and take a step backward when we stood near the fires. Burning embers floated into the sky.

Robbins was the first person to walk across the coals. Several staff members then followed his example, one after the other. They carefully and in exaggerated fashion followed the instructions so we would get the right idea. They huffed and puffed just before setting foot on the coals and walked stiffly across with eyes fixed on a point in the sky.

News photographers' lights lit up the scene. They were allowed to photograph only the staffers. The students might be too easily

distracted, Robbins said. They might lose their concentration and get burned. (One of the few times Robbins admits to getting burned while firewalking was when he walked on fire while being filmed for a TV show and was distracted during the firewalk by the talk-show host.)

Our spirits were high and the peptalk had been inspiring. People began walking across the coals and shouting in excitement, encouraging those yet to walk and congratulating those who finished. There was always someone walking on one bed or the other. The effect was to surround the firewalking experience with considerable noise and movement. It is not clear why the firewalk leaders encourage all of this distracting tumult while at the same time saying that a few photographers' flash lamps would distract the walkers. By the end of the seminar I had been swept up by the group spirit and was one of the first to walk across the coals. I was thrilled.

More than 90 percent of the participants, or about 80 tenderfeet, walked. Very few got blisters or, at any rate, very few volunteered that they had. Bernie did see two women with blisters at another walk he attended and there have been news accounts of others.

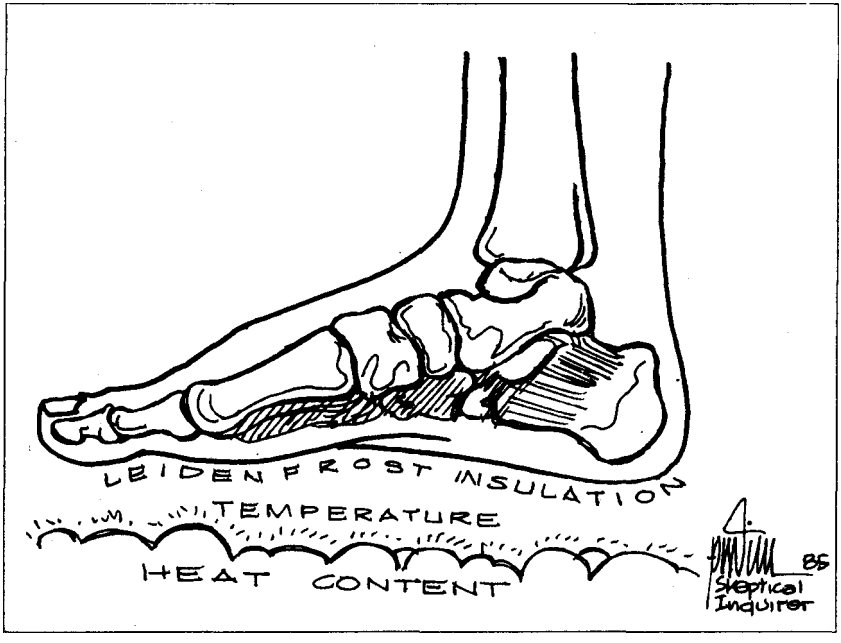
* * *

While the seminarians were walking, I (BJL) was trying to take picture of the footprints I could clearly see in the embers. After the jam of walkers eased somewhat, I took my place in line. The firewalk leaders made me stand and take some breaths, but as soon as I took my first step I violated their rules—I decided that it might be a good idea to look where I was going, something that my mother always urged me to do. I did follow one of their rules. I wiped my feet when I got to the end. By this time the embers had cooled quite a lot and were not glowing much any more. They felt like warm moss on my feet. I was quite disappointed, so when they brought over a new load of glowing embers I jumped at the opportunity and was the first to walk. This time they were a lot hotter and I thought that I might have sizzled my feet, but I couldn't find any damage.

How can it be done?

Firewalking appears to be one of those strange phenomena that, while appearing to be difficult or impossible, are actually quite easy to do once the trick is discovered. Evidently this trick has been found out by many peoples throughout the world, although it is ordinarily associated with mystical or religious states of mind. For

example, one firewalker from Sri Lanka said: "Anyone can do this if he prepares properly." That proper preparation, he went on to say, "may involve a week or two of fasting, prayer and meditation, devotional chants, frequent baths and celibacy" (Doherty 1982). For anyone who is planning a walk but finds this last requirement too extreme. I have been told by a reliable source that celibacy is not a prerequisite for a successful walk.



The secret to firewalking and many similar heat-defying stunts lies in the distinction between temperature and heat (or internal energy). This distinction is not a part of our commonsense notions, although all of us are actually familiar with it as part of our daily lives. For example, when we are baking a cake, the air in the oven, the cake, and the cake pan are all at about the same temperature. None of us would think for a moment before putting our hands into the hot oven air, but we know that we cannot touch the cake pan for more than an instant without being burned. Why is this? They really are at the same temperature. Why would the pan burn us and not the equally hot oven air?

The answer is that different materials at the same temperature contain different amounts of thermal or heat energy and also have

different abilities to carry the energy from one place to another. Thus the air has a low heat capacity and a poor thermal conductivity, while the aluminium has a high heat capacity and a high thermal conductivity. Our bodies have a relatively high heat capacity, similar to water. When we put our hands in the hot oven air, energy flows from the air to our hands. As the energy leaves the air it cools and our hands warm up. But, because the air holds very little energy, it cools much more than our hands warm. Furthermore, because of the poor ability of the air to conduct heat from far away to our hands, it will take a long time for our hands to finally get baked. In contrast, the aluminium cake-pan holds a lot of thermal energy and is an excellent conductor of heat. When we touch the metal and energy flows from the pan into our hands, the metal does not drop in temperature very much and even brings energy from far away to replace its losses while our hands quickly warm. It is for these reasons that we put a potholder, a poor conductor of heat, between our hand and the pan and don't worry about the air. So just knowing the temperature is not enough to decide whether something will burn us.

Firewalking and walking on hot rocks, as is done in Fiji, are based on this same idea. The embers are light, fluffy carbon compounds. Although they may be at a fairly high temperature (1,000° to 1,200° F), they do not contain as much energy as we might expect from our commonsense notions of incandescent objects. Thus, so long as we do not spend too much time on the embers our feet will probably not get hot enough to burn. In fact, because the capacity of the embers is low and that of our feet relatively high, the embers cool off when we step on them. How do I know this ? Well, the color and intensity of the light from the embers tells us their temperature; yellow embers are hotter than orange, orange hotter than red, and so on. When I watched people walking across the bed of coals I could clearly see darkened footprints where the coals had cooled because of contact with the feet. In a couple of seconds the combustion reactions restored the embers' temperature and glow.

In my reading about firewalking and fire-handling, I have found the combination of low heat capacity and poor thermal conductivity to be the one common factor. For example, in Fiji, where people walk on hot rocks, they choose cobbles of volcanic rock, probably pumice. Pumice is that strange porous rock that floats in water. It has a low heat capacity and a poor thermal conductivity. Similarly, fire-

handlers can withstand flames on their bodies, for a short time, because the hot gases contain relatively small quantities of heat.

We may well ask, "Why is it that some people get burned and others do not?" The answer is that the practice of firewalking is not a controlled scientific experiment. There are many variables from one person to the next and from one moment to the next: how long we stay on the embers, how many steps we take, how tough the soles of our feet are, and whether we walk where the embers are deep or shallow, for example. It certainly is possible to get injured, especially if we believe that it is our mind that protects us and if we do not take into account the normal physical behaviour of heat. *Rolling Stone* magazine (Krakauer 1984) reported in one group of firewalkers the average length of time on the coals was 1.5 seconds, with the longest being 1.9 seconds, except for one unfortunate woman with a brain and spine injury who, walking with canes and believing that her mind would protect her, courageously spent seven seconds on the embers before collapsing with severe burns. Another walker, a radio news reporter in San Francisco, a tough and fearless former war-correspondent apparently strolled more slowly than the previous walkers and strayed to the side into a deep pile of embers, where she badly burned her arches. There are many such variable factors, and in the tumult and excitement it is very difficult to make careful observations.

Another scientifically based explanation for the firewalking is the Leidenfrost effect. This effect is produced by getting a thermally insulating layer (like a potholder) between our feet and the embers. This principle is actually known to some of us and used in our ordinary lives. For example, some cooks will sprinkle drops of water onto a pan to see if it is hot enough. If so, the drops evaporate relatively quickly; if not enough the drops will dance or jump around for a surprisingly long time. Why does this happen? If the pan is sufficiently hot, a layer of water vapor forms between the drop and the skillet. This layer reduces the heat flow to the drop because vapors and gases are generally poor conductors of heat. When we wet our fingers before touching an iron to see if it is hot, or before putting out a candle, we are using this effect as well as taking advantage of the high heat capacity of water. It is also used in certain magic tricks, such as dipping fingers into molten lead, licking red-hot knives, and so on. However, moisture, while often present at firewalking, is not

invariably present. James Randi told me that in Sri Lanka the walkers believe that moisture on their feet will cause the embers to stick, so they carefully dry their feet before they walk.

Since the Leidenfrost effect is well known and thoroughly documented, and since the walkers are often in a state of great physical excitement, their feet may be "sweaty" because of the nearness of hot fire, and the surroundings of the bed of embers is often wet, I conclude that the Leidenfrost effect is likely to be helpful but not necessary for firewalking, provided the heat capacity, thermal conductivity, and temperature of the embers or rocks is suitably low. It is certainly true that at Robbins's firewalks the sod and ground around the fires are usually kept fairly wet.

All of the various other explanations for firewalking I have come across in my investigations begin with the assumption that you should get burned unless some special exotic effects are operating. Thus, instead of searching for ways in which normal physics or physiology might operate to reduce the likelihood of a burn, firewalk theorists search for anomalies in normal science or in areas on the frontier where scientists are still puzzled. Most of the explanations involve the necessity for "correct" beliefs on the part of the firewalker. For some, the belief alone is somehow sufficient. This is perhaps what is believed by the Greek firewalkers who carry statues of the saints as they walk. For others, the correct belief is supposed to induce physiological changes that protect the walker. For example, endorphins—chemicals found in the brain that have been associated with feelings of pain and pleasure—are imagined to increase because of the correct beliefs and to then protect the body from burns. Some believe that the physiological changes involve the "bioelectric field." As they approach the embers they can, they say, feel the electricity around them and believe that they are somehow shielded by it. Another theory is that the proper beliefs change the properties of nerves and muscles so that they can conduct the heat away from the feet. Still others believe that the ability of some people to cause small changes in the temperature of their hands and feet might somehow be utilized to a much larger extent by firewalkers.

One characteristic of all of these explanations is that they are totally unsupported by any direct experimental data. Where is the measurement of the bioelectric field before, during, and after firewalking? Where is the demonstration of electrostatic shielding of

heat? Where is the evidence showing that endorphins reduce damage from injuries?

There is a simple experiment that could be done to prove whether one's mental state effects the thermal properties of one's feet. The Tony Robbins people make such a claim. They say that walkers are in a certain "state" that protects them. Why not measure the flow of heat into some one's foot as they go in and out of this state? This would be easy to do and would involve no risk, since it could be done at low temperatures.

Bill and I believe that the explanation for the lack of burns is found in the ordinary physics of heat and materials. There are, however, some interesting psychological effects that play a role in the experience of fire walking. Bill will now describe this role.

What are the Psychological Factors?

Psychology can explain why some people feel no pain or heat, even when they have been exposed to enough heat to produce blisters. It is necessary to distinguish the concept of pain from the concept of being burned. Pain from a burn is a perception that the body has been injured. People can get burned without feeling pain, and we can feel pain when no injury has occurred. Many of us have had the experience of cutting ourselves and not realizing that we are injured for some time. As a matter of fact, I (WJM) must admit that I did get burned when I firewalked. I got a dime-sized blister on my left foot, under my arch. Despite this evidence that I was burned, I remember feeling no pain, and I didn't discover the blister until the next morning.

The detection of pain caused by exposure to fire is not only a function of the temperature of our feet; it is also affected by the general sensitivity of our body and mind and by the presence of other competing sensations. If we are in a quiet room and fully alert, we will be maximally sensitive to pain. If we are tired and surrounded by noisy, distracting events, we will be much less sensitive. Distraction can reduce the pain people experience, because they can attend to only a few things at once. Distraction is the basis for a number of techniques psychologists teach patients who suffer chronic pain. These techniques are quite effective.

In addition, the physiological responsiveness of our bodies is governed to a large extent by a circadian rhythm. When we stay awake well past our normal bedtime, our normal physiological func-

tions are nevertheless somewhat depressed—as if the body expected to be asleep even though it wasn't. The people who walked on the coals at 1.00 A.M. were therefore much less likely to feel pain or heat than they would have been had they conducted the same walk at 1.00 P.M.

Furthermore, the instructions we had been given before the walk actually seemed calculated to distract our attention from the sensations of our feet. Concentrating on the "mantra," looking up at the sky, hearing the applause and shouts of elation, and breathing in an artificial and forced manner, all served to distract the walker.

Women and men who are familiar with the Lamaze technique for preparing women for the rigors of childbirth know that increasing one's breathing rate in a prescribed manner just before the moment of greatest pain helps to reduce the pain that the mother experiences. The controlled breathing taught in the seminar had the same effect of reducing the maximum pain the firewalkers experienced. The likelihood of their perceiving any pain even if they were burned was greatly reduced.

Scientific Assessment

Firewalking, as practiced in this country, is being used as the keystone of a self-improvement program. It is claimed that by using special techniques the student can walk on hot coals. It is further claimed that these same techniques can be applied to solve the problems of ordinary life. Firewalking can be so surprising to us that it can have a powerful effect on our beliefs. Students frequently speak of having their entire system of beliefs blown after succeeding. Thus there can be no doubt about its powerful persuasive effect.

Nevertheless, as we have explained, the training has nothing at all to do with whether or not a firewalker will be burned. It does have some effect on whether you will want to walk and on what you will experience as you walk, but whether you avoid a burn is determined by the ordinary behavior of heat on the soles of your feet.

It is probably safe to say that the seminar we witnessed at least temporarily increased the self-esteem and confidence of most of the participants. The training effectively used techniques like behavioral modelling, verbal persuasion, and group pressures, which are well known to psychologists. We did not assess how long the benefits last or how well they might translate into increased success at the more mundane tasks of life. Many of the formulas for success were no

different from those available in conventional self-help and positive-thinking programs. Those who were burned or who ultimately lacked the courage to walk, on the other hand, were very likely to experience a decrease in self-esteem and confidence because they would be likely to believe that their minds were weak.

The firewalk is an unusual and very persuasive technique. The seminar students are led to believe that it represents the first of what will be many examples of the wonderful effects of the seminar training. As we have shown, however, the training has nothing to do with not getting burned, since anyone can walk on the embers without much chance of injury. The students, unfortunately, do not know this, and it is this deceptive but persuasive practice that is our greatest concern.

The students may be led to accept the correctness of all that is offered during the seminar. In fact about one-fifth of the firewalkers pay as much as $375 for a full weekend course involving neurolinguistic programming, and, we are told, new and exotic theories of nutrition. Now neurolinguistic programming may be a useful addition to mainstream psychology, but from the material presented in the seminar it is certainly impossible to make a sensible judgment. The extreme claims for psychic- or faith-healing-style cures certainly cast doubt upon its truth, as does the use of a trick to supposedly show its effectiveness.

We are, of course, unable to read the minds of those who teach and profit from firewalking. We cannot tell if they are themselves deceived, simply ignorant, or charlatans. In any case, some people are clearly being harmed. Because elementary physics is not known, some are being burned. Because success is attributed to mental strength, those who are burned or fail to walk are damaged. And those who succeed are likely to believe much of the rest of the teachings of the trainers. Some of these teachings are fine, but others are quite exotic and strange, if not actually dangerous. What will happen to the believers when, inevitably, they learn the truth? Because all of the beneficial aspects of these trainings are available from other, more conventional sources, such as college courses in psychology and nutrition (perhaps, even a physics course), which have few harmful effects, we cannot find any justification for the deception that is being practiced and we would advise everyone to stay away. The firewalk trainers are misleading us about the key-

stone of their program—that it is their training that makes it possible for us to walk on hot coals. Considering that this basic principle of their program is wrong, the rest of it cannot be trusted.

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PSEUDOSCIENCE, SCIENTISTS, AND THE PUBLIC

Pseudoscience has a long history and has appeared in many guises. Yet only comparatively recently have scientific institutions such as associations for the advancement of science come to take its existence seriously. This has occured because there are many Pseudoscientific doctrines which seek public legitimation and support by claiming to be scientific; others purport to offer alternative accounts to those of science or claim to explain what science cannot explain. Both types are thought to pose a potential threat to the public understanding of science. Many laymen have difficulty in distinguishing science from impostures because they have only a vey vague idea of what science is about. There has been a growing tendency among members of the educated public and especially among intellectuals, including even some scientists, to challenge the right of scientific opinion to deciding voice in what is to be regarded as science and what as pseudoscience. This challenge is directed againt the " elitist dogmatism" of science, and is part and parcel of a broader contemporary movement to denigrate science. It is claimed that scientists have no rational grounds for distinguishing science, from pseudoscience and do so solely to retain their present monopoly over the investigation of nature. Many scientists believe that the popularization of pseudoscientific ideas through print, film television and radio helps to confuse the public about the true nature of science, fosters uncritical acceptance of false notions generally, and, in some instances, may play on superstitions and irrational fears.

— J. W. Grove,
"Rationality at Risk: Science against Pseudoscience."

11

Critical Reading, Careful Writing, and the Bermuda Triangle

Larry Kusche

In August 1977, the College Entrance Examination Board issued a report concerning the causes of the continuing decline of the skills and capacities of high school students going into college. Although some of the conclusions concerning the effect of television and the breakdown of the family were necessarily subjective because of inconclusive evidence, several firm conclusions were reached. Among them is that the decline is partly because "less thoughtful and critical reading is now being demanded and done, and that careful writing has apparently about gone out of style."

Although the reference to the lack of careful writing is apparently directed toward the students themselves, it should also be taken to include the writings that the students read, virtually all of which is done by writers a generation or two older, who do not have the same excuse for sloppy research and slovenly logic and writing techniques.

Much of the reading that students now do is called "high interest reading." It has to be high interest in order to grab their attention, to compete with the likes of the Six Million Dollar Man, Woman, and Dog, the Fonz, and Darth Vader. There does not seem to be much reading being assigned, at least in the field of the "paranormal," that is highly logical or accurate. It almost seems as if there is a belief among publishers that interest and logic are inversely proportional to each other. They are not, of course, but that seems to be the prevailing belief.

A typical example of high interest reading, taken from one of the subjects of the season, the Bermuda Triangle, follows.

> The *Sandra* was a square-cut tramp steamer, decorated here and there with rust spots along her 350-foot length. Radio-

equipped and loaded with 300 tons of insecticide, she leisurely thumped her way south in the heavily travelled coastal shipping lanes of Florida in June 1950.

The crewmen who had finished mess drifted to the aft deck to smoke and to reflect upon the setting sun and what the morrow might bring. Through the tropical dusk that shrouded the peaceful Florida coastline they watched the friendly blinking beacon at St. Augustine. The next morning all were gone. Neither the ship nor the crew were ever seen again. They had silently vanished during the night under the starlit sky. No clue to help solve this baffling mystery has been found to this very day.

Mysterious wasn't it? A tranquil sea. Quiet circles of smoke slowly drifting from the deck. Twilight. A clear sky. Ah, peace. The fate of the *Sandra* has been a matter of curiosity of millions of readers in the past few years, but I wonder how many of the readers have thought about it long enough to have noticed the glaring flaws in the story. I wonder how many readers have a high enough *CQ* (Curiosity Quotient) to take just a few seconds to analyze the case.

Those with a low *CQ* ask questions like, "What strange force could possibly have caused this inexplicable loss? Why has nothing from the *Sandra* been found even to this very day? What is wrong with the area out there?" (Note that the low *CQ* questions are the same as those asked in the currently popular pro-mystery books on the subject).

The reader with the high *CQ* would have seen warning flags all over the story of the *Sandra.* Alarm bells should have rung. Yes, there is something wrong, not so much with the *Sandra* or "out there," but with the *telling of the story itself.*

If the *Sandra* disappeared that very night, how could anyone have known and reported what the crewmen were doing as the sun set? Did the men saunter over to the rail to smoke and chat about the sunset? How could the writer have known that? Did they really see the lights of St. Augustine? Was the sea really tranquil? All these points are crucial to the loss because they indirectly set the scene—a quiet, peaceful evening. That is, after all, why the loss of the *Sandra* is considered strange. If conditions had been stormy, the loss would not be considered unusual.

Even before taking the time to check into the weather (why

bother doing that—it's all documented, isn't it?), the curious intelligent reader should already be questioning the account of the *Sandra.* How was the writer able to know what the sailors saw, thought, or said that night? Was the writer perhaps on the ship himself, luckily lifted off by helicopter or a small boat in time to miss the disappearance? Unlikely. If I had been that writer I'd have plainly stated that that was what happened.

Did the radioman send this crucial information about the scene to shore? Again, quite unlikely. One doesn't usually paint pastel pictures over the radio. How then, could the writer know that much about what happened on the ship? How could he know if the men saw the light of St. Augustine? Did he know where the ship was at all?

The answer to the thinking person with the faintest shred of curiosity and intelligence is that the writer could *not* have known any of the "facts" he "reported." He had to have assumed them or have lifted them from someone else.

Is it nit-picking to observe that the "facts" could not logically have been known? Are these "facts" important? Obviously, they are crucially important. The writer was using a common, blatant writing technique that I call "setting the scene." The writer indirectly informs the reader that all was calm, all was right as the steamer chugged along. The crewmen obviously were not worried about any impending danger. There were no storms. It makes the "disappearance" all the more mysterious. The ship was "known" to have been off St. Augustine, practically pinpointing its area of disappearance, and making the lack of debris even more mysterious.

But, was the ship really near St. Augustine? Based on the writer's information, we cannot really know that. He says that *the crewmen saw the light,* not that anyone ever saw the ship. But he can't know what the crewmen saw. Did the ship "silently vanish"? If no one knows what happened, if no reporter was nearby taking notes, how do we know it was nice and quiet? May be they were fighting for their lives, but the "silent vanishment" treatment is far more mysterious. It certainly has a higher interest, as compared to just an ordinary old sinking.

All this the intelligent reader might have deduced for himself, without doing any outside research. There is not much that the writer gave us that appears to be solid. Perhaps he's right, perhaps not.

Give an infinite number of monkeys an infinite number of typewriters....

The writer has used another technique which I call "undue familiarity." He mentions the "rust spots along her 350-foot length," implying that he, personally, knows about the old *Sandra*. After all, if he can describe it in that precise detail, he must have some firsthand knowledge. Perhaps he was the one who spotted it off St. Augustine. He really does his research, doesn't he?

There is just one problem here. Upon checking with Lloyd's of London I learned that the *Sandra* was only 185 feet long, just about half what the writer said it was. Now about those rust spots and the writer's apparent familiarity with the ship....

Neither the length of the ship nor the spots are crucially important, of course: but they do point out, once again, that the writer's credibility is very low. Almost everything he has said is blatantly in error, or is speculation. The true length of the ship is of some importance, however, since we can probably assume that a 350-foot ship would handle weather, if it were bad, better than a 185-footer.

But the incident is still unexplained despite all the obvious erroneous assumptions and errors. The (rare) diligent reader who is interested in following up on the case might contact the weather bureau's record centre in Asheville, North Carolina, and ask for the records for June. The result is that he would find that the weather *was* excellent, just like the mystery purveyors said.Now we're really stumped. Perhaps there is something "out there" after all. A ship simply cannot disappear without a trace in perfect weather.

So our diligent researcher keeps trying. Any research on a missing ship would be incomplete without contacting Lloyd's of London. Lo! What do we find there? The mystery monger made another error! The *Sandra* did not sail in June, it sailed on April 5. The weather records are now checked for the proper month, and this time we find that beginning the day the *Sandra* sailed from Savannah, and for the next few days, the Atlantic shipping lanes off the southeast United States were buffeted by winds up to seventy-three miles an hour, only two miles an hour under hurricane strength.

All the basic "facts" as presented in the mystery of the *Sandra* are now shown to be wrong. Read again the "mystery" and compare what the writer said to what really occurred. Crewmen drifting to the deck to smoke ? Watching the peaceful Florida coastline ? Seeing the

friendly little old beacon at St. Augustine? Silently vanishing? The near hurricane does change the situation just a bit.

Yet, a number of writers have used the *Sandra* as further "proof" that something strange is going on "out there." They failed to prove their theory, but they have helped confirm one of mine, that the less a writer knows about his subject, the better equipped he is to write a mystery about it. Ignorance of the subject is, in fact, a major technique in writing about the mystery of the Bermuda Triangle and other subjects in the so-called paranormal as well. Some critics of the Bermuda Triangle refer to it as science fiction, but that is an unfair description. Unfair, that is, to science fiction. The Bermuda Triangle, as well as many other "paranormal" topics, might more properly be called "fictional science."

Many people find the "mystery," full of illogic and errors that they are unaware of, to be of a higher interest than the correct answer, of the detective work necessary to track it down. Those people who revel in the uncritical claims of pseudoscience, of the "paranormal," might properly be called the "pseudocurious" or the "paracurious." They claim to want the truth, but they really don't want it. They watch Alan Landsburg's "In Search Of" television program and believe that, because *TV Guide* and Leonard Nimoy say so, that it is a documentary. They read the tomes of Berlitz., Winer, Spencer, Jeffrey, Godwin, and Sanderson and boggle their minds, as they say. Yet all these books are chock full of examples such as the *Sandra,* confirming the complaints of the College Entrance Examination Board. Careful writing, at least in the area of the pro-para normal, has gone out of style, and the readers *are* less critical. The readers claim to be seeking illumination but are, in fact, only seeking light entertainment. There will always be plenty of Barnum, Bailey, and Berlitz writers and publishers around to satiate their hunger and further erode their logic.

(*The Skeptical Inquirer*—Vol. II No. 1—Fall/Winter 1977)

GOD

I believe in Spinoza's God who reveals himself in the orderly harmony of what exists, not in a God who concerns himself, with the fates and actions of human beings.

— Albert Einstein

12

Bermuda Triangle, 1981 Model

Michael R. Dennett

With a voracious appetite the "Bermuda Triangle" is gobbling up ships and planes again! Or so we were informed by author-researcher Charles Berlitz in an exclusive interview for the *Globe*, a national tabloid, in April 1980.

"Fifty airplanes vanish in two years" announced the headline. Later, in the text, it was asserted that more than 100 ships also disappeared during the same period. Perhaps even more interesting was Berlitz's claim that the government, the Navy in particular, was conspiring to keep these disappearances a secret.

These are certainly strong statements. One might justifiably ask how Berlitz can substantiate them.

Berlitz is a well-known author, lecturer, and UFO proponent. Two of his books have been best-sellers, and he recently contributed an article to *Omni*. In the text of the *Globe* interview Berlitz was referred to as both a "Bermuda [Triangle] expert" and as a "top researcher." More impressive than these credentials, however, was Berlitz's willingness to identify the data on which he based his claims. So confident was the air of the interview that it almost seemed to say: Here are the facts, check them out for yourself. I decided to try.

A close examination of the article revealed that the large numbers of ships, yachts, and airplanes alleged to have vanished were only estimates and that there were only a dozen "unexplained" incidents during the 25-month period ending in January 1980. Presumably Berlitz's estimate that "an average of one plane about every two weeks and a ship or yacht each week vanished without a trace in the Triangle area" was based on the twelve incidents he detailed for us. He went on to add: "It now becomes more apparent than ever that most of the disappearances take place during December, January and February ".

However, it is not apparent to us that either of these statements can be deduced from *his* information. The nine incidents where ships or planes were allegedly lost do not seem to point to the three months Berlitz indicates; during the entire 25-month period no loss occurred in December. In the two Februaries only one incident was logged, and in the three Januaries, in only one, January 1980, were losses recorded (see Table 1). The year 1979, which according to our "Triangle expert" should have had 24 aircraft and 52 vessel losses, is barren of "mysteries", with the exception of the disappearance of a single private aircraft in April. Even if the data are accepted at face value they fail to support Berlitz's estimate of disasters or the concentration of them in a particular period.

TABLE 1

Aircraft and Vessels Lost Between January 1978 and January 1980
(Data from details of Berlitz interview, April 1980)

Year	1978											
Month	J	F	M	A	M	J	J	A	S	O	N	D
Planes lost		1					1		1			
Vessels lost							1			2		

Year	1979											
Month	J	F	M	A	M	J	J	A	S	O	N	D
Planes lost				1								
Vessels lost												

Year	1980											
Month	J	F	M	A	M	J	J	A	S	O	N	D
Planes lost	3											
Vessels lost												

We are left, then, with the twelve "eerie incidents". The list, although far short of the announced figures, still seems impressive and includes four occurrences involving commercial airlines and three concerning either the Navy or the Marine Corps. The remaining five events relate to small private aircraft and vessels. Do these incidents substantiate Berlitz's claim that "the Triangle is sucking in victims"? The best way to answer this question is to examine each mystery in detail.

Event No. 1 Berlitz version:

January 27, 1978: National Airlines Flight 120, from Miami to Newark, N.

J., suddenly loses power on all three of its jet engines. The Boeing 727 plunges from 33,000 feet over the Atlantic to 25,000 feet. The 103 passengers are terrified. The engines mysteriously restart and the plane lands at Jacksonville, Florida. Despite a grueling FAA mechanical inspection, officials find nothing wrong with the aircraft.

Although a bit sensationalized, this is a reasonably accurate description of what happened to National Flight 120. The mystery of why the engines momentarily failed was solved about a month later when an embarrassed flight engineer admitted that he had inadvertently forgotten to turn on the fuel boost pumps. With the boost pumps off, a vapor lock occurred, cutting fuel from the engines. As the 727 plunged without power the crew initiated restart procedures. During restart the boost pumps were selected, which overcame the vapor lock and returned fuel to the engines. With fuel now in the engines they started up, and the plane was brought in safely to Jacksonville.

There was considerable media coverage of the determination of the cause of the triple flameout of Flight 120, in part due to the fact that it was initially unexplained. National Airlines (now Pan American) put out a news release, and *Aviation Daily* carried an article covering the event. An open letter was posted by the flight engineer and the incident was reported to the National Transportation Safety Board and to the manufacturer, Boeing Aircraft. Since Berlitz's interview took place more than two years after this event was explained, one can only conclude that his research sometimes falls short of perfection.

Event No. 2, Berlitz version:

Feb. 22, 1978: Lt. Cmdr. Paul Smyth and navigator Lt. Richard Leonard vanish in their KA-6 attack bomber as they approach the aircraft carrier U.S.S. John F. Kennedy.

In the body of the article, Berlitz also states that Commander Smyth was "heading in clear weather to the carrier." This statement is simply not true. Weather records show that a storm had been sweeping east across the United States and had dropped an inch of snow on Norfolk that morning. The Coast Guard had announced a small-craft advisory. Out at sea the winds were from the northwest at 25-35 miles an hour and gusting up to 45. Skies were partly cloudy, not clear, and waves were about 10 feet.

Shortly after takeoff Smyth radioed that he was having trouble. Radar tracking indicated that the KA-6 was losing altitude, and con-

tact was lost altogether approximately 28 nautical miles from the carrier's position (lat 36° 18.4' N, long 74° 33.7' W) on an azimuth of 266°. An immediate air search was launched, but no wreckage was found and it was presumed that the aircraft had disintegrated on impact with the sea, 500 miles from the Bermuda Triangle.

The Navy, which I found most cooperative, listed the exact cause of loss as unknown but according to the judge advocate general's investigative report this particular plane (AB524) had a history of mechanical difficulties.

Event No. 3, Berlitz version:

> July 17, 1978: Three people on board a Cessna 172, on a flight between Tobago and Trinidad, vanish in clear weather.

As in most of Berlitz's reports of incidents, no names are given; nor is the aircraft identified by registration or tail number. This makes the investigation difficult, especially because of the location. What makes this case significant is that the aircraft "vanish[ed] in clear weather." Or did it? The weather forecast in the *Trinidad Guardian* for July 17, 1978, was for mainly fair conditions, with seas slight to moderate, but with waves upto two meters in open water. As it turned out, both the forecast and Berlitz were quite incorrect about the weather for that day. The feature article on the front page of the Port-of-Spain daily the next day announced: "Torrential rains caused havoc in Trinidad and to a lesser extent in Tobago yesterday. The all-day downpour which continued into last night disrupted social and economic activities, caused several road accidents, severe flooding..." Apparently the rains were accompanied by high winds, since the article states that "roofs of scores of homes were blown off." The storm was not isolated to Trinidad; the *Guardian* gave an eyewitness report of conditions in Tobago as follows: "It is raining like hell over here."

James Ahwai, director of Civil Aviation (Trinidad), confirmed that a man named Johnston, his two companions, and his plane, a single engine Cessna 172 (N734TR), were caught in this storm and failed to reach their destination. Both land and sea searches failed to locate the plane. While the loss was certainly unfortunate, it is hardly mysterious.

Event No. 4, Berlitz version:

> July 1978: (No exact date.) A Navy porpoise training ship, with a crew of five, disappears off Key West, Florida.

The Navy has only one base within 100 miles of Key West, and that is the Naval Air Station at Key West. Strangely, no record of this incident was available from the base Office of Information, and a check showed that the *Miami Herald's* Key West edition for the month of July 1978 was silent on this event. The editor of the local Key West paper was sure that no Navy vessel had been lost in the area during the summer of 1978, a statement which was confirmed by the Coast Guard. In Washington, the Navy people who had been so helpful with my investigation of the loss of Lieutenant Commander Smyth and his plane were unable to make a records check without either the ship's name or the name of at least one of the crew. Furthermore, they informed me that no such thing as a porpoise training vessel (either boat or ship) exists in the Navy, a statement I was able to verify by independent sources.

This event, based on the information given by Berlitz, cannot therefore be substantiated.

Event No. 5, Berlitz version:

> Aug. 7, 1978: A Braniff Airlines jet unexplainably begins to shake violently and vibrate in midair over Cuba. The flight from Honduras makes it safely to Miami. Fifteen people are injured.

The *Miami Herald* for August 7 carried an article about tropical storm Bess, which was about 300 miles east-northeast of Tampico, Mexico, with winds of about 45 mph. It is possible that Bess was the cause of the problems noted by Berlitz, but it did not happen to a Braniff jet because Braniff did not then, nor does it now, have a flight between Miami and Honduras.

Event No. 6, Berlitz version:

> Sept. 21, 1978: A DC-3 passenger plane owned by Argosy Airlines vanishes near Cuba with four people on board.

In the summer of 1978, Argosy Airlines had been chartered by a citrus growers group to fly 25 of its members to Cuba and then to return on September 21 to fly them back. Cuban and U.S. Treasury permission had been obtained and Argosy Airlines had made the first flight to Cuba and back. On the morning of the twenty-first, George Hamilton, the owner of the airline and the pilot for this flight, prepared his DC-3, registration number N405D, and fueled it to capacity (605 gallons) with 100-octane aviation gasoline. First Officer Peter Rustenberghe requested and received a weather briefing about 7.00 A.M. EDT. Rustenberghe also filed a flight plan indi-

cating a departure time of 10·00 A.M. The flight was delayed until 11.29 A.M. apparently because of the late arrival of one of the cabin attendants. Leaving Fort Lauderdale Flight 902 progressed south to a TADPO Intersection point, at which time Miami Centre advised that radar service was terminated and that the flight should contact Havana control at 128.8 MHz. Argosy 902 acknowledged Miami Center's instructions and, according to Cuban officials, established contact with Havana control. At 12.43 P.M. Cuban radar contact was lost with Captain Hamilton's plane. A search was initiated at 1.47 P.M. by Cuban authorities and the U.S. Coast Guard joined the effort at about 3.00 P.M. In addition to numerous aircraft, four Coast Guard vessels were employed, but no trace of the aircraft was found.

What happened to Flight 902? We probably will never know for sure what occurred sometime around 12.43 P.M. to Flight 902, but one can make some educated guesses. Whatever caused the disappearance of this plane, it would almost certainly have had to be sudden and violent, as attested to by the lack of a distress call or wreckage. There are some clues to what that cause may have been. As a flight sanctioned by the Cuban government, it could have been a target for sabotage by anti-Castro elements in Florida. It is possible that a bomb was placed aboard the DC-3.

Had Berlitz really investigated this incident, he would have learned that a terrorist anti-Castro organization known as Hijos de la Estrella Solitaria (Sons of the Solitary Star) exists in the Miami area and that the Miami office of United Press International received a call from an alleged spokesman for this group shortly after the flight was lost claiming "full responsibility for the explosion of the DC-3 over Cuban water."

Event No. 7, Berlitz version:

> Oct. 14, 1978: A twin-engine fishing boat, *Buddy Too*, vanishes after leaving Miami on a 5-hour fishing trip with six people aboard.

This incident, like others that Berlitz includes, contain at least one major error, and without the aid of a number of people from the Coast Guard I would never have been able to track it down. The *Buddy Too* did not depart for a fishing trip from Miami but from Topsail Beach, North Carolina. The 26-foot power boat was on an all-day fishing trip, not a 5 hr excursion, and the weather was poor. In fact, a small-craft warning was in effect when the *Buddy Too* left port, and by afternoon the weather had deteriorated. A Coast Guard

captain, who was questioned at the time by a local newspaper reporter, said that he would not have taken out a boat the size of the *Buddy Too* in that kind of weather. The six men were due back at about five o'clock, but the Coast Guard was not contacted until 8.05 P.M. well after dark. A considerable search effort was made, including Coast Guard, Marine Navy, and Air Force planes and three Coast Guard ships. Some debris was sighted and an aluminium fishing locker was identified as belonging to the craft, grim indication that the small boat had gone down in rough seas more than 300 miles outside of the "Triangle."

Event No. 8, Berlitz version:

> Oct. 1978: (No exact date.) Three people on a 40-foot cabin cruiser disappear in clear weather and calm seas during a short trip between Bimini and Miami.

This case is, as Berlitz might describe it, a classic Bermuda Triangle disappearance. It has all the hallmarks of such an occurrence; namely, an unidentified vessel, with three unnamed people on board, vanishes on an unspecified date. The local newspapers carried no report of this incident and the Coast Guard was unable to confirm that a vessel matching this description had been lost in October.

Event No. 9, Berlitz version:

> Dec. 25, 1978: Braniff Flight 709, with 153 passengers on board, plunges 10,000 feet after an unexplainable series of tremendous vibrations in midair over Bimini. The plane lands safely at Miami.

According to a Braniff spokesman, Flight 709, en route to Miami, experienced clear air turbulence, a well-known natural phenomenon. No passengers were injured and no damage was done to the aircraft. The flight arrived on schedule in Miami.

Event No. 10, Berlitz version:

> April 26, 1979: A Cherokee Arrow, on flight between Miami and Nassau, vanishes, although land was in sight during most of its flight.

The National Transportation Safety Board and the Federal Aviation Administration, both of which maintain extensive records of aircraft accidents, were unable to verify this one. A search of the *Miami Herald* and several other periodicals also failed to confirm that this event occurred.

Event No. 11, Berlitz version:

> Jan. 2, 1980: Two Phantom jets, with four Marine flyers on board, disappear after taking off on a routine training flight from Beaufort Marine Air Station, South Carolina.

The incident is the cause celebre of the article and is reinforced not only by Berlitz's investigative skills but also by those of J. Manson Valentine.

What the article avoids emphasizing is that these, two jets were participating in simulated combat manoeuvres—at night. Manoeuvres that might well bring the two planes into proximity to each other. This night exercise was restricted to a training area extending only 75 miles east of Beaufort, *more than 300 miles from the Bermuda Triangle.*

Berlitz and Valentine claim that the Marine Corps hushed up the incident, a contention that is difficult to accept since they never contacted the post commander, Colonel Rutherford, or the public affairs officer, Captain Jordan.

The Marine Corpos official position is that, while the exact nature of the loss is unknown, a mid air collision shortly after takeoff is presumed to have been the cause.

If these two "top researchers" had actually investigated this event, it is hard to understand how they missed the Beaufort County Sheriff's Department, the Sea Pines-Forest Beach Fire Department, the Tybee Island Coast Guard Station, and the local newspaper, the *Island Packet.* Had they contacted any of these they would have found that there were six eyewitnesses to a brilliant flash or explosion in the vicinity of Hilton Head Island on January 2 at approximately 7.45 P.M. This observation of an apparent explosion, by a bartender, a security guard, a commercial pilot, two Hilton Head residents, and a Port toyal woman, coincides with the estimated position of the two F-4s. While these reports are not positive proof of a collision, they provide a reasonable answer to the disappearance of the two Marine aircraft. Any facts that would support the contention that a "cover-up" had been perpetrated or that Valentine and Berlitz made a thorough investigation seems to have vanished without a trace.

Event No. 12, Berlitz version:

> Jan. 10, 1980: A twin-engine Cessna Conquest, carrying Louisiana State University football coach Bo Rein, leaves Shreveport for Baton Rouge. Suddenly, the plane flies in the opposite direction, heading for the Atlantic and the Bermuda Triangle.... Five hours later after travelling 1,500 miles in an almost straight line, the plane plunges into the Atlantic.... An Air Force spokesman describes the doomed flight as "very eerie."

Actually, the crash of the Cessna Conquest 441 took place on January 11. What happened, according to FAA investigators, was an

apparent case of hypoxia (lack of oxygen) due either to a loss of cabin pressure or to the exceeding of the aircraft's service ceiling. On two previous occasions his particular plane had been grounded because of control problems that could cause it to climb or dive erratically. After taking off from Shreveport, the pilot, Lewis Benscotter, radioed that he was heading toward Memphis to avoid bad weather. As the aircraft climbed, probably the two men experienced hyposia and then the aircraft flew under control of its autopilot until it ran out of fuel and crashed into the Atlantic. The *Washington Post* labeled it a "bizarre" incident, and one must agree that it was at least very unusual. But with thousands of private aircraft being flown every day, unlikely circumstances do occur.

By the use of adjectives like "doomed" and "very eerie," the writer can set a mood for his story on which he may then capitalize by distorting the events. "Suddenly, the plane flies in the opposite direction" implies that there is no apparent reason for the action. This type of rhetoric may be colorful, but it is not investigative reporting.

With this last incident we have exhausted Berlitz's proofs of a "devil's triangle disaster." As superficial as these events may seem individually, taken as a whole the picture is even more astonishing: 75 percent of the incidents *did not even occur in the "triangle"* (see map). Of the three events that did manage to fall in the triangle, two are unverifiable and the third is a simple case of clear-air turbulence.

Lawrence Kusche, a diligent investigative author, has remarked: "The less a writer knows about his subject, the better equipped he is to write a mystery about it. Ignorance of the subject is, in fact, a major technique in writing about the mystery of the Bermuda Triangle and other subjects in the so-called paranormal." Berlitz's recent claims bear Kusche out.

(*The Skeptical Inquirer*—Vol. VI, No. I—Fall 1981)

When a man's knowledge is not in order, the more of it he has, the greater will be his confusion.

— Herbert Spencer

What we need is not the will to believe, but the wish to find out.

— Bertrand Russell

13

Scientific temper, What it is!
The only way to solve our problem

M. G. K. Menon

In the process of evolution man developed four highly significant abilities: tool making and the general intelligent manipulation of objects; speech, and the development of sophisticated vocabulary; the capacity for social development which permitted an increased ability to cooperate within the family or the tribe; and most important, the ability to reason logically. These attributes are the principal ones that separate man from other higher animals. The ability to reason logically has its origins in the evolution of the human brain; and through the ages, man has used this significantly to become the most dominant and powerful species on earth.

About ten thousand years ago man developed the ability to cultivate, on a controlled basis, plant species suitable for food; this was the beginning of agriculture. This relieved humankind from its nomadic existence in search of food as was available in nature. It resulted in human settlements and stronger cooperative relations; and a sense of security from want. It thereby gave man very much more time to think and reason, and to satisfy his sense of curiosity about the surroundings and the natural phenomena that he observed. He applied a great deal of the information so gathered, and this he analysed in an empirical manner, to various practical activities that he was engaged on—agriculture, weaving, pottery, handling and shaping materials, tool making, etc., and developed ways of living not too different from what obtains today.

The Origin of Science

While a large part of his observations and analysis related to aspects of his daily needs and their fulfilment, there also arose, in parallel, thinking of a philosophical character on basic aspects of nature unrelated to human needs. Apart from metaphysics and

philosophy. this basic work was initially in the areas of mathematics and astronomy and then moved into the disciplines of physics and chemistry. In these developments lay the origins of science—man's ability to reason logically, having the leisure to think and satisfy his curiosity, and cooperative relationships within the community which led to fruitful interaction.

At each point in time there has been a limit to scientific understanding. Many aspects of human thought and experience remained outside scientific explanation. These were looked at from other angles based on intuition and deep philosophical thought; they were often manifested in music, literature and other art forms to name some of the other great creative abilities of humankind. There were, of course, many in society who approached these questions that lay outside scientific understanding at that point of time, in terms of myths, superstitions, miracles and other types of obscurantism. Miracle workers, witchcraft practitioners, godmen and charlatans appeared in society because they could derive power and material benefits in their manner of functioning. When overwhelmed by force of nature, in facing completely unknown situations and at moments of deep emotion, particularly sorrow, it has generally not been possible for man to reason logically.

In the early stages of human development there were pseudo sciences like cabbalistic number lore, geomancy, alchemy and so on. Several of them demanded observations and experimentation, and gave rise in time to meaningful science. Thus chemistry is an offspring of alchemy.

Society has always had within it a mix of: those working towards fulfilment of human needs and aspirations through increased scientific understanding of nature, or even through empirical applications without a true scientific understanding; those engaged in deep philosophical thought concerning the many things outside the ken of scientific reasoning; and finally those concerned with obscurantist approaches. The extent of this mix has varied from society to society and from time to time. Indeed, one can say that a mix of rational objective thinking of intuitive, philosophical and impressionistic thinking and of irrational obscurantist thinking exists within each human being; but the mix varies from society to society, from individual to individual and their backgrounds of education etc. and with time.

The march of science

Great scientific discoveries, and human development based on the application of logical reasoning, took place in the ancient civilizations in China, India, Mesopotamia and Egypt and thereafter in Greece, Rome and in the northern parts of South America and in Central America. However, in all these areas, though the developments were striking they were not to stay. The flowering of intellectual creativity was transitory; and after passing through a zenith, relapsed into traditional pedantry. The spectacular march of modern science which we witness today, and which has lasted several hundreds of years, took place in Europe around 1400 A.D. A succession of events took place that triggered and consolidated this march of science. Principally, there was an intellectual ferment characterised by the understanding that knowledge was to be advanced not by reliance on ancient authorities but by studying nature and by acting on it.

It is interesting to note that Gautama the Buddha had said the following:

"Believe nothing
merely because you have been told it
Or because it is traditional
Or because you yourself have imagined it
Do not believe what your teacher tells you,
merely out of respect for the teacher
But whatever after due examination and analysis
you find to be conducive to the good
the benefit,
the welfare of all beings,
that doctrine believe and cling to,
and take it as your guide."

Over the past five hundred years there have occurred two major developments of profound significance for human development. First, there was Scientific Revolution which placed science on its present exponential growth, to attain an intellectual virtuosity that characterises it today, and which has made it an indispensable feature of a new industrial civilization. Then there was the Industrial Revolution which resulted in a great transformation in the means of production. Over recent centuries there has developed a symbiotic relationship between science and technological aspects relating to production in agriculture and industry; and we see today a powerful unified functioning of an integrated science and technology. This

has led to economic and social changes of profound magnitude.

Developments in India

We might now ask ourselves: what have been the developments in India? First, it must be recognized that India has had a long and glorious tradition of creative activity. The well-planned civilizations of the Indus Valley period; the great scientific discoveries such as of the decimal place value system, and other important work in algebra, geometry, astronomy; the discovery of distillation in chemistry; the holistic system of health and treatment of disease as in Ayurveda; the great traditions in metallurgy; the capabilities in civil engineering and architecture characterised by major road systems and classical monuments of the country—these all illustrate the scientific understanding, the application of scientific knowledge and the scientific method and aesthetic sense that characterised earlier Indian society.

Equally, the real paintings of Ajanta and the sculpture of Ellora, the miniature paintings of the North, the traditions in Carnatic and Hindustani music, the prestigious dance forms of Bharatnatyam and Kathak, the great folk arts, the epics in literature the great treatises in philosophy—these illustrate the diversity and wide span of Indian creative endeavour. These activities spanned the centuries from about five thousand years ago; there were periods of great flowering and then gaps.

However, over the past 300 years, during the period of internecine strife and colonial domination, there was general decadence with a lack of positivism and of innovation. The great intellectual traditions of Indian philosophy or of scientific reasoning that were seen earlier were nowhere on the scene; parochial, bigoted narrow minded and conservative approaches took over in society with consequences for all creative activity. India could not, therefore, take advantage of the scientific and industrial revolutions when they took place in the West.

Renaissance in scientific activity

There has been, however, an intellectual ferment over the past hundred years as part of the freedom struggle which moved Indian society as a whole and corresponding to it there has been a Renaissance in Indian scientific activity characterised by the real work of men like J. C. Bose, P. C. Ray, C. V. Raman, M. N. Saha, S. N. Bose, M. Visweswarayya, S. Ramanujan, etc. On the scene outside science,

there were the towering figures of Raja Ram Mohan Roy, Swami Vivekananda, Ravindranath Tagore, Aurobindo Ghosh to name but a few; and then there was Mahatma Gandhi and the many great leaders of the freedom movement. (This is only mentioned to indicate the widespread nature of the Renaissance).

Amongst Indian leaders, the one who understood most clearly the relationship between science and society was Jawaharlal Nehru who has remarked "Science is not a matter of merely looking at test tubes and mixing this and that and producing things big or small. Science, ultimately, is a way of training the mind and the whole life functioning according to the ways and methods of science." This demands a continuing long range programme of developing, in all sections of society, what Jawaharlal Nehru referred to as the 'scientific temper'.

1958 Scientific Policy Resolution

The Scientific Policy Resolution, which was adopted by the Government of India on 4th March, 1958, and which was primarily due to Jawaharlal Nehru, has in it, several sentences which forcefully bring out certain fundamental concepts. In particular, it states : "It is only through the scientific approach and method, and the use of scientific knowledge that reasonable material and cultural amenities and services can be provided for every member of the community..", and "science had led to the growth and diffusion of culture to an extent never possible before... It has provided new tools of thought and has extended man's mental horizon. It has thus influenced even the basic values of life and given to civilization a new vitality and a new dynamism."

The Scientific Policy Resolution states what Jawaharlal Nehru recognized, that science was not some thing only for the professionals in science, or for an intellectual elite, but is of concern to and involved society as a whole. Let me amplify this point. Science is often regarded as a vast repository of knowledge, or of complicated instruments and equipment demanding specialised capabilities. These, no doubt, are a part of a great deal of science as practised today. But primarily, science represents a spirit of inquiry and is based on the process of logical reasoning. What is important is the scientific method which consists of: making observations; making measurements with the greatest precision possible; analysing the observations and measurements; building a hypothesis or theory

which would fit the measurements, which could involve generalisations resulting in prediction of other phenomena; experiments or calculations to look for these and to test the hypothesis or theory; building up self-consistent theoretical or experimental methods in their own right; and so on. There is no acceptance of authority. What is accepted finally is that which can be confirmed independently by anyone desirous of verifying the facts. The scientific method is applicable not just to the narrow confines of what many would define as science. The scientific method is of general applicability. It is the spread of this rational, objective, enquiring approach that Jawaharlal Nehru wanted to see in society, and which he very appropriately referred to as the scientific temper.

Propagating Scientific Temper

The development of scientific temper involves : the growth of a coherent scientific community which is concerned not only with the skilled use of the techniques and instruments of science in its professional work, but also has a deep commitment to the rational and objective methods of enquiry and analyses that characterise science; in ensuring that the scientific method, and in the broader sense the process of logical reasoning, is used in decision-making in the country in all facets of national endeavour, particularly in a manner which is visible; and inculcating the method and spirit of science in society as a whole. How can all of this be brought about ? In my view the most important single element is education. What is required is a new design for the educational system in which, instead of the present approach which largely involved a body of knowledge being handed over to a student to be memorized and retained, and to be brought out at appropriate occasions such as examinations, we should relate the educational system to the environment around. All of us have had the great fortune of associating with children; and we immediately notice the insatiable desire on their part to know and to understand the world, to find connections between things and events, very often asking questions that are inconvenient and are difficult to answer. Education as it exists today, instead of encouraging this curiosity and spirit of enquiry, kills it. I would like to emphasise that everything that we wish to normally teach children, name, language, mathematics, science, moral values, basic features of history, geography, etc., can all be taught through experiences that they can have in their immediate vicinity, and which would and

should be of great interest and excitement to them.

Again, it is important that the child is taught in a language, with which he(she) has basic familarity. If he(she) is taught in a language which itself in an unfamiliar one, then he (she) will find it difficult to properly understand what has been taught and express himself (herself). The student will depend entirely on the exact manner in which the items have been taught to him (her) : in form, in content and in a language, with no deviations. This is completely contrary to the spirit of science which demands free independent thinking and expression.

Solving problems in a scientific way

Another important element for propagating scientific temper is to ensure that a large part of the scientific work done in the country is not imitative of what is done elsewhere but derives truly from problems encountered in the immediate environment and the attempt to find solutions to these problems using the scientific method. The work in itself may not be at the frontiers of science or of the greatest international importance; but a continuous process in which the scientific community and society around it attempts to solve problems that it faces, using the approach of science, is the best way in which scientific temper can be propagated. Since science is international, there is need to have in the scientific community those working at the frontiers of science who are truly gifted for this, whose work arises from a genuine inner urge, and is not imitative. Their work will set standards of scientific excellence, and make available ideas, training and new developments of relevance to the rest of the effort.

Very often, popularisation of science is confused with propagation of scientific temper. I would like to stress that popularisation of science is only a part of the propagation of scientific temper. It is certainly important for our society to be told about the scientific efforts being made in the country, and of its achievements; as also of the advances that are taking place in the world as a whole. But, the process of popularisation is often limited to a presentation of knowledge in simple terms. What is more important is to convey a feeling for the manner in which that knowledge was acquired, through the process of reasoning, observation, experimentation, analysis and so on, namely the approach to problem-solving.

There is a tendency to regard science itself as a miracle, and as a

magic wand to solve all our problems. This myth needs to be eliminated. We have to recognize that society will have to solve its own problems, and that society has within itself capabilities, including the power of the scientific method, for the purpose.

Limits of scientific enquiry?

Finally, I would like to make a brief reference to the question of the actual limits of scientific enquiry: namely, are there aspects of human experience that lie outside possible scientific explanation or recognition? There are those who would argue that, considering the tremendous successes of natural science in its various branches as they developed, there are no limits to scientific understanding of any phenomena or of any human experience. Their argument is that many previously mysterious processes are now well understood through progress in science; and this will continue to take place. It would then be reasonable to predict that no observable phenomena need be regarded as beyond the reach of science: even though one may never actually achieve that complete degree of understanding.

Whilst I would agree that the expanding horizons of science will encompass within its scope of understanding a great deal that presently lies outside it, I have serious doubts whether scientific insight will cover every aspect of human experience. For example, it is true that some time we may discover very much more about the human brain and the nerve circuits in it and the kind of harmonics in these which may enable us to explain why some combinations of sound are highly attractive, such as in music, and others not. After all, music can be analysed in terms of frequencies and amplitudes and their various combinations; one can also study the processes at work in the brain, physically, chemically, physiologically, psychologically, etc. But the direct and immediate impression created by music has aspects that lie beyond this.

Again, it is going to be extremely difficult to have scientific definitions in ethics of right and wrong, of good and evil, of happiness and sorrow. There is continuity of thought from the scientific to the humanistic which we need to recognize. Human reaction to music or to an ethical problem when stated may appear to be imprecise and indefinite when judged by the requirements in science. But such statements have their role and value. Thus, to say that science is complete is not to say that it is all embracing. The intrinsic value of science would be enhanced if scientists and those who do not profes-

sionally deal with science were more aware of the many other ways dealing with human experience such as art, poetry, literature, philosophy, and forms of expression or impression, some of them analogous to religion.

There are some who would make the implicit claim that only the scientific approach is legitimate and reasonable. But science and technology are only some of the avenues towards reality; others are equally needed to comprehend the full significance of our existence. The mathematician Goedel proved that a system of axioms can never be based on itself; in order to prove its validity, statements from outside the system must be used. This is probably true for science as a whole. It is necessarily embedded in a wider realm of human experience. The propagation of scientific temper and the spirit of science should ensure that all the approaches lead in an overall positive direction rather than narrow-minded parochialism and obscurantism.

(*Yojana*, Aug. 15, 1983)

WINNOWING DEEP TRUTHS FROM DEEP NONSENSE

At the heart of science is an essential tension between two seemingly contradictory attitudes—an openness to new ideas, no matter how bizarre or counterintuitive they may be, and the most ruthless skeptical scrutiny of all ideas, old and new. This is how deep truths are winnowed from deep nonsense. Of course, scientists make mistakes in trying to understand the world, but there is a built-in error—correcting mechanism : The collective enterprise of creative thinking and skeptical thinking together keeps the field on track.

— Carl Sagan,
"The Fine Art of Baloney Detection."

14

Interview with P. N. Haksar

on Scientific Temper or bondage of traditions

by the Chief Editor of the *"Yojana"*

Chief Editor: To begin with, would you please like to comment on the relevance of the theme—Scientific Temper or bondage of traditions.

P. N. Haksar: Past, Present and Future interpenetrate and interact with each other. As a result *parampara* (tradition) and *parivartan* (change) are constantly in a state of tension. Even in the midst of revolutionary upheavals, ideas, values, habits, moulds of thought and institutions rooted in *parampara* continue to live. But the logic of *parivartan* whether revolutionary or evolutionary, demands change. This need for change gets reflected in human minds. They then begin to perceive that element of the past are an impediment to their social, political, economic and cultural aspirations. Thus the bondage of the past which has a negative effect on *parivartan* is broken. The wider and deeper the human consciousness for change, the quicker the pace, easier the transition. In the 20th Century, both the level and the range of human consciousness is qualitatively and quantitatively of a high order. Hence, the pace of change is faster than at any time in human history. We can see it in our own country.

According to our *parampara* rooted in *sanatan kal* (ancient times) and sanctioned of *sanatan dharma* our society is governed in all its details by the laws of *varna-ashram*, or by Islamic prescriptions. Marriage, birth, death, funeral rites, names we give, the dress we wear, the food we eat, our love, our hate—all are powerfully regulated by our *parampara*. At the same time wide mass of our people, even those scattered in our villages or living in a tribal society are asserting their human rights or collective identities. We talk of fundamental human rights which are entrenched in our Constitution. The concept of the rights of each individual citizen of India contradicts the concept of *varna-ashram dharma*. One or the other will prevail.

The tensions resulting from the conflict between tradition and the need for change can only be analysed and understood by the application of knowledge derived from history, economics, politics, sociology, psychology, science and technology. When we do this, we are responding to scientific temper breaking the bondage of traditions. We proceed on the assumption that *parivartan* is not pre-ordained.

Scientific temper invites us to dissect, analyse, observe, inter-relate social, economic, cultural and political phenomena in terms other than Divine Will. It invites us to question every dogma. The scientific temper is rooted in our human heritage. Without it we human beings would still be living in caves, eating wild berries and by hunting.

C.E: How you think life goes about today—frankly speaking, we see a frightening mess up—take for instance, the social turmoil; the bigots in full fury attempting to overtake progressive and secular forces; this onslaught of revivalism; and worst of all, the obvious helplessness to turn the tide.

P. N. Haksar: The life today looks like a frightening mess-up because the past, present and future, are as it were, locked in a mortal combat. Nevertheless, there is sprouting all around us the seeds of our future. Therefore, I am not overwhelmed by the messy part of our life today. What, however, causes me deep concern is not so much the bigotry, the revivalism etc., but the loss of a vision of our future based on affirmation of primacy of knowledge over ignorance, superstition and backwardness. The overwhelming pre-occupation with money making is truly destructive and snuffs out creativity. This needs to be actively combated.

C. E.: We, by habit, often boast of our past—has it not much to do with the life we live today? Why time and again we see it necessary to look up to the past to meet our difficulties?

P. N. Haksar: Old people and defeated people invariably look to the past. That is all they have. And yet, past cannot be jettisoned. Past has to be understood. That which is valid must be nursed through our educational processes, which take place in our homes, in our schools and colleges and when we hear radio and see television and films. Despite Jawaharlal Nehru's serious efforts to discover India and good deal of work done by our historians, the evolution of our past and its results do not inform our educational processes.

That is why past hangs heavily on our present. That is why images of the past are evoked even by those who say that they are engaged in creating a new India. Our past, howsoever great and glorious, cannot help us in solving new problems which inevitably arise. We then retreat from reason. Irrationality takes hold of us. And the vested interests, both political and economic, deliberately feed irrationality and unreason.

C. E.: Is, right now, not the time to give a serious look at our traditions and call a spade a spade?

P. N. Haksar: As I have argued in reply to your previous question, this needs to be done with a sense of urgency. Failure to do so will engulf us in a terrible miasma of all that is backward in our tradition, be it Hindu, Islamic, Sikh or Christian.

C.E.: Now, this sensitive area of religion. Does it really help build up peace and progress? Does it really serve promoting scientific temper?

P. N. Haksar: The area of religion should not be sensitive at all. The relation of human beings to their God and their feeling for something sacred ought not to cause trouble. It only causes strife when religion is seized upon for promoting political ends. Faith and reason can co-exist provided we understand clearly the role which each has to play in the lives of human beings. In this view of the matter, scientific temper need not declare a war on religion except when, as I have said, politics masquerade in religious garb. Unfortunately, in our country this happens on a massive scale. It is also fed by the nature of our economy and the character of our politicians. It is seriously aggravated by the way we have organized our electoral processes.

C. E.: What do you think of our educational system? As it is, it seems to be anti-scientific temper? Or else, how could we explain the present mess-up, obviously the handiwork of the educated?

P. N. Haksar: If truth be told, the educational system we have is not "our" at all. It is still the one which was designed by Macaulay. He rules as from his grave. Everyone knows what he had in mind. That system of education has never been reformed, despite all the brave statements made about reforming the system. It is heavily weighted in favour of passing an examination, getting a degree and getting a job. It is not animated by the spirit of enquiry. It is therefore

overwhelmingly a system of inertia, and, as you say, it is not informed by any sort of value system and is weighted against scientific temper. However, I do not agree that the mess-up is the work of the so-called educated. The mess-up is the direct result of utter thoughtlessness of our politicians who, by and large, are engaged in the game of power without any discernible purpose.

C.E.: How about our science policy? It now completes 25 years. Whither it takes us?

P. N. Haksar: This is a very big question you have put to me. There is no time to go into and to see what has happened since the Science Policy Resolution adopted by our Parliament. This is a subject which needs to be dealt with separately. My impression on the whole is that between the statement on science policy and its detailed implementation, there is a yawning gap. Worse still is our technology policy despite recent pronouncement.

C.E.: And lastly Sir, how to create climate for promoting scientific temper? What role, you think, is media, particularly the wire one, playing today? Don't you think it needs taking up its job more seriously?

P. N. Haksar: In reply to your previous question, I had broadly indicated what needs to be done to promote scientific temper. First of all one has to understand what it is and then, fight for it by every means available. It is an uphill task in an ancient society like ours. We have to fight for reason against unreason, to fight for rationality against irrationality, to fight against superstition and to assert the triumph of reason and hope.

(*Yojana* Aug. 15, 1983)

DEAD WEIGHT OF RITUALS

No people in the world waste more time in religious ritual than we Indians. And no people stick as stubbornly to traditions which have lost their purpose of meaning as we do. In the case of religious ritual I use the word waste because it has no bearing on improving a person's character. In the case of traditions, they rob us of initiative and enterprise which are necessary qualities for a nation which aspires to be progressive and catch up with the most advanced countries of the world.

— Khushwant Singh

15

Tests and Investigations of Three Psychics

James Randi

New Evidence in the Uri Geller Matter

In October of 1977, I received a letter from Tel Aviv, Israel, signed by Mr. Yasha Katz. It was an invitation to get from him the "truth" about Uri Geller. Katz had been Geller's manager for two years. I had previously met and spoken with Mr. Katz in New York concerning details of my book *The Magic of Uri Geller,* and in that book I declared that I felt Mr. Katz to be innocent of any wrong doing in regard to promoting the Geller myth. It was my opinion that Katz was a dupe, and not one of the dupers. Our conversation at that time showed him to be very naive and an experienced apologist for Mr. Geller, but not necessarily a confederate in the deceptions.

These matters, however, are pretty well predictable. Those who are first taken in often are subsequently asked to cooperate in the fakery, for a variety of plausible reasons. Psychics have for generations pressed investigators to accept the "powers" they exhibit as ephemeral, spontaneous, and not always available, particularly under pressure or under "negative" influences such as skepticism. Quite honest disciples are convinced, in light of the miracles they have already witnessed, that occassionally cheating must be allowed—to maintain a reputation and to pay for the groceries. And seldom do the disciples fail to go along with this suggestion. But now, said Katz, he was prepared to tell all he knew about the psychic superstar.

It was inevitable that Yasha Katz would arrive at this point in his relationship with Geller. He had obtained a contract early in the Geller rise to fame that entitled him to a percentage of all engagements booked outside of the Unites States; and since he was in on all the press conferences and attended all the shows, he had to become

aware of the methods of deception Geller was using. Still, a strong-conviction remained that Geller did have genuine psychic powers. Katz discussed some of these things with me during that secret meeting in New York City, and I recorded the meeting in detail.

Two things had assured him that Geller had real psi-powers. One evening, he told me, he had attended a theater with Geller and a few other friends. Awaiting the arrival of a car after the show, he witnessed a "teleportation." When Geller had taken his seat in the theater, he'd called attention to the fact that there was an armrest missing from the seat he'd chosen. Now, while the two waited for the car to come, Katz was to witness a miracle. He heard a sound above his head, and looked up in time to see an object falling to the ground at his feet. It fell in a small puddle, and Katz retrieved it. Lo ! it was a vinyl-covered armrest—doubtless from that same theater!

On another occasion, Katz had left Uri alone in their New York apartment and gone to the street, several floors down, to buy a newspaper. Upon his return, he discovered that a huge "planter" formerly located inside the apartment, was now standing outside in the hall. He excitedly awakened Uri, who was inside, supposedly sleeping soundly, and together they struggled the thing back in to the room. And, said Katz, it was impossible that Geller could have put the thing there by normal means, since it was so heavy that even with both of them lifting it Uri strained himself in the process.

Both these events had convinced Yasha Katz that, regardless of the "feats of clay" that Geller exhibited, he did have *some* genuine abilities. Today, his opinion is rather different. Let us examine both these convincing claims.

In the first case, Katz gave me two different versions. During the recording we made in Israel, he embellished the story to say that he had looked up and had seen the armrest "levitated, floating in the air." Then it had fallen at his feet into the puddle. "... I removed it, and it was perfect *dry,* not a drop of water on it." Really ? I picked up a glass of water and poured part of it on the armrest, which Katz had saved as a relic all those years. The water ran off it immediately, and it was perfectly dry. I looked at Katz. He was smiling uncomfortably. As for the "levitation," I reminded Yasha of what he had said just previously about Geller's methods of "materialization"—but we'll come to that item shortly (point 6).

As for the planter that had spirited itself out of the apartment,

Yasha was adamant. He had referred to it in our New York interview as "like cast iron" but this was a reference to its mass, not the material. My recording of this talk does not make that clear. Actually, as Yasha showed me, it was made up of heavy glass blocks, and weighed about 120 pounds or so. For Katz had it sitting right there in his Tel Aviv apartment! He'd brought it with him to Israel.

"You *can't lift* that planter!" said Katz. I stood up to try. "No, no! Never mind!" he exclaimed as I began removing potted plants from it. He came over to me and tried to discourage me from trying this simple experiment. I heaved, and up it came. I replaced it, and put the plants back in position. Now, if I, at forty-eight years and weighing 155 pounds, can *lift* this thing, surely Uri Geller could *pull* it out into the hall a few feet while Yasha Katz is out of the building buying a paper!

On my recording of this event, there is an abrupt change of subject by Mr. Katz. I could not bring him back to the planter episode again.

My expenses for the Israel visit were picked up by RAI-TV, the Italian television network. Earlier in 1977, I'd contacted Piero Angela, a leading journalist in Italy, and he had set out to do a lengthy documentation of parapsychological work around the world. At first believing that he would have a fairly convincing story to tell about the scientific work being done, since he'd read the books and found it difficult to disbelieve them, he'd had a rude awakening after visiting the laboratories and interviewing the scientists involved. He'd found evasion and poor rapport everywhere. When I notified him of Katz's desire to confess his involvement, I called Angela and was immediately told that he was interested. Though the hour-long segment on Geller (there are five hours of this documentary) was already edited and ready to be broadcast, Angela felt the new information might be valuable enough to redo the segment. And it was.

First, I had a private recording session with Katz. From it, I made a list of main points he told me, and the next day, Katz sat before the cameras and gave details of these events. He also expressed serious doubt about his previous positive attitude about Geller, since a demonstration I'd given the night before had shaken him up a bit. There was hardly an intact spoon in the place, and mutilated keys were everywhere in the apartment.

Here is a list of Katz's points, prepared from the tape and written up within hours of the interview. I have omitted several items from this list, since they are very personal in nature, and have little to do with the question of whether Geller is genuine or not:

Yasha Katz, interviewed by James Randi in Tel Aviv, December 1977, gave details of his association with Uri Geller, the "psychic," whom he worked with as manager for two years.

1. Katz says that Geller brainwashed him by performing impromptu tricks for him, even after Katz was aware that Geller resorted to tricks to fool his audiences. Such tricks were designed to keep Katz believing that Uri had *some* powers.

2. Katz was instructed to sit in the audience and give Geller special signals to indicate what word had been written on a blackboard out of Geller's sight. He signaled, using both his cigarette and his hands. This trick was presented by Geller as a genuine demonstration of ESP.

3. Geller took notes on unusual models of cars and licence plates used by persons in the audience, and later revealed these details to his audience. On one particular occasion, Katz noted that Geller watched a newspaper reporter in California get out of a Porsche, and later he stunned the reporter by describing his car and the license plate number.

4. Geller stationed Katz near the box-office to note details about certain people entering the theatre, which were relayed to Geller so he could reveal them from the stage as if he were using ESP.

5. Katz stooged for Geller to "teleport" a spoon for an *Express* reporter in Paris. He threw the spoon into the air to the ceiling.

6. Geller frequently, says Katz, threw objects from behind his back, over his shoulder, to make them "materialize," and Katz witnessed it many times.

7. Once, in Palm Beach, Katz caught Geller sneaking the lens cap off a camera to perform his "psychic photo" trick.

8. When Geller was to appear in Birmingham, England, word arrived backstage that the front row was packed with magicians. Geller, says Katz, turned white and refused to go out on stage. He talked Katz and Werner Schmid, the producer, into making up a story about a bomb threat, and the two told this to the press. Geller claimed to the reporters and audience that Katz and Schmid would not let him appear, but that he wanted to do so. They left town with a police guard and the show was cancelled.

9. Katz often caught Geller doing the ESP trick wherein he would try to guess what the subject had written; then when the subject's target was revealed, he would quickly duplicate it on his own pad secretly, and show it to the subject with great elation.

10. Visiting Sylvia Fine, Danny Kaye's wife, Geller broke a special piece of heirloom jewelry. Katz clearly saw Geller take it between his hands when she was not looking, and break it; he then claimed it had broken in a supernatural manner.

11. In London, Geller wanted to impress a publisher who was trying to get him to sign a contract. He arranged with Katz to leave a hotel telephone off the hook and concealed near the publisher, so that he, Geller, could listen in several rooms away. Then he burst into the room and "psychically" revealed details of their conversation.

12. Geller has been featuring an old trick recently in which four persons stand about a seated subject and lift him with their fingers. It is supposed to be a genuine "levitation." Katz showed this trick to Geller in Germany, as a gag. It is a common parlor-trick.

13. As an example of methods used on the media, Katz says that on an ABC morning TV show from San Francisco, he was instructed by Geller to go into the producer's office when Geller distracted the staff and determine what was in a sealed envelope. It was a drawing of a flag. Katz informed Geller, and Geller acted out, in his usual manner, the "ESP" impression he was getting from the sealed envelope when he appeared on the TV show.

14. Last year, reports Katz, a reporter from the *National Enquirer* came to Katz for a story about Geller; but since he could only give her negative opinions and facts, she abandoned the story, saying her editor had instructed her to get only a positive story, regardless of the truth.

15. Katz says Geller and his confederate, Shipi Shtrang, now have become citizens of Mexico, since Mexico has no extradition treaty with Israel. Shipi left Israel without reporting for military service, and Geller got him false medical papers in New York from a cooperative doctor. Now that Shtrang and Geller are wanted for questioning in Israel, Geller is taking refuge in Mexico with Shtrang.

16. Geller's and Shipi's passports were arranged by president-to-be Portillo, at the urging of his wife, who is a devotee of parapsychology and a good friend of Geller. The residency requirement was waived.

In the light of this evidence, can there be any remaining "proof" of Geller's authenticity? He has consistently refused to appear for testing at reputable laboratories, though he has promised to show up. He will be tested only by those who already have a firm belief in such matters. The record is clear: Geller, as the others who claim these powers, ignores legitimate offers from interested scientists who can perform adequately controlled tests. His abilities are not only unproven—they are mythical.

Exit Jean-Pierre Girard, "The World's Greatest Psychic"

As interest in Uri Geller has continued to fade following his numerous failures and the exposures of his methods of trickery, coupled with revelations about what really happened in the highly touted laboratory tests that supposedly "proved" his powers, periodicals such as the *National Enquirer* have been casting about for a new psychic superstar. They believed they had found one last year, and front-page headlines declared the discovery of "The World's Greatest Psychic" in the person of Jean-Pierre Girard, a pharmaceutical salesman from Paris who convinced officials in Pechiney, a large aluminium producer in France, that he had psychokinetic powers. All that requires rethinking now.

In *The Humanist* (Sept./Oct. 1977) I outlined tests that had been conducted on Girard in Grenoble, France, by members of the Committee for the Scientific Investigation of Claims of the Paranormal in June of 1977. The tests were absolutely negative. With all test objects, under controlled conditions agreed to in advance by all parties, Girard was unable to produce any effects whatsoever over a period of three and a half hours.

Girard, once highly regarded in Europe as a psychic, has met a number of Waterloos recently, and for once the parapsychologists cannot complain that he was treated unfairly. The complaint is repeatedly heard that (a) scientists refuse to examine the claims of the parapsychologists, (b) tests are not done properly, in accordance with established latitude, and (c) enough chances are not given for these elusive powers to be demonstrated. No longer can these cries be made legitimately, if they ever were valid objections in the first place.

In the February 1978 issue of *La Recherache,* the French scientific magazine, eight authorities give accounts of experiments done with Girard that should prove definitively whether his claims of psi powers are genuine or just more of the hot air that one has grown accustomed to in these matters. The experiments were largely based on the protocols we designed to use in Grenoble with Girard. He was given marked aluminium-alloy bars to bend while watched by a video camera. In all cases he failed to produce any paranormal effects.

Girard has now undergone four carefully designed and conducted tests: with scientists Leprince-Ringuet and Trillat on September 29, 1976; with Randi, Davies, and Evans in June of 1977; with Bernard Dreyfus in September of 1977; and with Yves Farge on January 19, 1978. All of these people, with the exception of myself, are trained scientists, and members of important bodies, such as the French Academy.

So we can state with confidence several facts: (a) Prestigious and qualified scientists *have* examined in detail and at length the claims of psi powers made by a prominent performer. These claims have been supported and endorsed by leading parapsychologists in the past, and they must now explain the inability of these other investigators to see any miracles in the tests. (b) In *all* these tests, the conditions were outlined in advance (as is the case in any legitimate

scientific procedure) and agreed to by the participants as being proper, fair, and adequate. Thus there is no basis for claims that these were badly designed tests. (c) Four tests, over a period of more than fifteen months, were conducted with the subject, thus giving adequate opportunity for these miracles to occur. They did not.

There remains, of course, the Catch-22 of the parapsychologists, that "negative" or skeptical persons present can inhibit the results. (I point with sad amusement to the remark of Charles Crussard that I have psychic powers, and used them to inhibit Girard's results!). If this is so, then the para-scientists have surrendered their rights to real scientific investigation, since a genuine test requires good observing conditions and proper design in order to be called scientific. Indeed, some investigators have stated that these wonders are not amenable to regular methods of scientific investigation and must be observed under "loose" conditions that allow room for trickery and poor conclusions. If this is so, then I call upon them to abandon their pleas for scientists to look into their bag of tricks.

We print here a report by Marcel Blanc, a science writer with *La Recharche* who has followed the Girard matter to its conclusion. (A briefer version appeared in *New Scientist*, Feb. 16). Though the evidence that makes this case is definitive, I am not at all persuaded that supporters of Girard will abandon him. They have far too much invested in him, financially and academically. Several persons have staked their reputations on his authenticity; they cannot retract their support without losing credibility. But this unfortunate circumstance does not affect the overall fact that the public has depended upon these persons as spokesmen for science, and belief in such para-powers has been largely a result of dependence on these "experts." True, it is a huge thing to expect a scientist to reverse himself after committing his career to such a chimera. But such painful obligations are a necessary part of their dedication to science.

With the publication of this account, I personally feel that the Girard matter may be considered closed. But should he wish to be further tested, the CSICP has the obligation, funds and time permitting, to accommodate him. Such is the nature of scientific endeavor, and this committee is totally dedicated to the scientific method, with all that it implies. We await further offers from Jean-Pierre Girard.

Skeptics Look at the Paranormal—by Marcel Blanc

As the new year started, psychokinesis, also known as spoon-bending science, again failed to reach the orbit of orthodox science. On January 19, Jean-Pierre Girard, the French Uri Geller, was unable to produce anything paranormal during a two-hour test in a Paris laboratory, organized by the French television channel TFI.

The experiment was directed by the physicist Yves Farge, Director of Research at the CNRS (Central National de la Recherche Scientifique). He was assisted by two colleagues—Yves Petroff and Etienne Guyon, as well as by the expert magician Klingsor, President of the International Magicians' Union. The first part of the test consisted of an attempt by J. P. Girard to bend some metallic bars paranormally. He followed the same protocol as the one worked out for his test in Grenoble last June by U.S. magician James Randi, *Nature* editor David Davies, and psychologist Christopher Evans (see the *New Scientist*, July 14, 1977).

During the second part of the test, Girard tried to make small objects move paranormally on a table, and make them levitate. The protocol for this purpose had been devised by Yves Farge, together with French magician Gérard Majax. In both experiments, J. P. Girard knew exactly what the protocols would be and had agreed before hand to their use. He nevertheless stated after the tests were over that he had been hampered by their short duration (one hour each). As for Charles Grussard, Research Director of Pechiney and Girard's foremost supporter, he told Yves Farge that as far as his team was concerned, "its members had agreed to work according to not-too-tight protocols," to enable Girard to display his fragile psi-power.

Physical Nature of Psi

The French Uri Geller was tested on two occasions in Grenoble during the interval between the June 1977 experiment with Randi and the more recent one with Farge in January 1978. A detailed account of both tests appeared in the February issue of *La Recherche*.

The Pechiney team had succeeded in persuading Bernard Dreyfus, Research Director of the Nuclear Study Centre in Grenoble and Chairman of the French Physics Society, to come to see J. P. Girard at work. In reality, however, he was only told at the last minute (on the evening of June 15) that he was expected to act as scientific guarantor for the report to be sent to *Nature* on the experiment he was about to witness. A magician was also present as an expert, and Dreyfus was told that *Nature* had devised the protocol (it had in fact been worked out a fortnight earlier by Randi, Davies, and Evans). As a result, Bernard Dreyfus became suddenly aware of the official nature of the meeting, which made him extremely cautious. He refused to authenticate the one slight bending of a bar produced that evening because it did not happen until the final agitated minute of a session that lasted from eleven o'clock until half past three in the morning. He therefore wrote to *Nature* that he had seen nothing paranormal that night.

[Note (by J.R.): To quote from Dreyfus's own account—"... a little after 3 o' clock (3 : 04 exactly) J.P.G. turned to Prost and was speaking with him, eye-to-eye. I noticed—and so noted in my notebook—that his movements were now very much less gentle, very much more energetic. Immediately after, and for the first time that night, the bar suffered a bend of one-tenth of a millimeter. It was slight, considering what Girard usually did, and he asked to continue..." The bar soon took another slight bend, accompanied by J.P.G.'s very strong gestures, and the session was ended. Dreyfus's account of this was not published by *Nature*...]

On September 24, 1977, Bernard Dreyfus again had J. P. Girard perform tests in his laboratory at the Nuclear Research Centre. Apart from a protocol supervised by two magicians with the aim of forestalling any cheating, the special feature of these experiments was the use of instruments to test the physical nature of Girard's hypothetical psi-power by detecting any changes it might cause in the gravity or electromagnetic fields. Nothing of the kind occurred, except for slight oscillations of compass needles, and these were produced under conditions that, according to Bernard Dreyfus, might have allowed Girard to conceal a magnet on his person. At any rate, he had been proved incapable of bending any bars or changing the structure of metals, as the Pechiney team maintained he could do. Bernard Dreyfus concluded his report as follows: "At the present stage it seems premature, to say the least, to conclude that paranormal phenomena actually exist."

[Note (by J.R.): Dreyfus's account specifies that not only did Girard accomplish the movement of the compass needles when most of the experimenters (including both magicians) were out of the room, and when the experiment had been temporarily suspended, but subsequently one of Dreyfus's colleagues discovered that it was possible to duplicate such movement easily with a small (3 mm) magnet concealed beneath a fingernail and indetectable with the instrumentation used in the test.]

It should be said in passing that Bernard Dreyfus also tested 13-year-old Steven North, from Britain, at a session held in Grenoble for TFI on December 19. North was brought to Grenoble by the British parapsychologist John Hasted. Again, the result of the test was negative.

A New Copernicus

Between June 1977 and January 1978, several parapsychological experiments were conducted by skeptical scientists. This is doubtless the most important event of the past few years in the field of parapsychological research, and shows the desire of parapsychologists for recognition by established science. On the other hand, the reactions of Bernard Dreyfus and Yves Farge are evidence of a new attitude as regards the scientist's responsibility toward society. For it was not merely in order to test parapsychological claims as such, in which they were not particularly interested at the outset, that Farge and Dreyfus agreed to invest time and work in preparing these laboratory experiments. Their real motive, as they both told me, was to counter present criticisms of scientists, who are often accused of being the aloof guardians of orthodox rationalism and deliberately ignoring psi effects, despite the growing craze for the paranormal among the general public.

Charles Crussard, on the contrary, likes comparing himself to a new Copernicus or, as he told me, to Newton. At any rate, he cannot say, after the recent series of experiments, that he has been treated like Galileo or Giordano Bruno.

However, that may be, the attempt by Girard and Crussard to put psychokinesis on the same orbit as established science seems about to collapse. The January issue of *Grands Articles du Mois* reported that Girard has given up his lawsuit against Jean-Pascal Huve for which he was condemned to pay costs. In the thirty-sixth issue of this review, published in December 1975, Huve had written an article entitled: *"A propos de Jean-Pierre Girard, le nouvel Uri Geller: Psi, escroquerie ou à-peu-près scientifique?"* (About Jean-Pierre Girard, the new Uri Geller: psi, swindle or more-or-less scientific?) Huve, who had known Girard personally

ever since he started spoon-bending at private meetings, wrote in the article: "We can state that all the experiments we witnessed were fraudulent, *on Girard's own admission.*"

In a book on cheating in parapsychology, to be published next spring, Gerard Majax, star magician on French television channel A2, states he made Girard's acquaintance in the course of the magician's opposition to Uri Geller. Majax discloses that, at the time, "Girard was attracted by the idea of staging a joke which would take in the scientists, and of unmasking the whole thing afterwards, thus proving how far they could be misled."

Girard now admits that he does sometimes cheat to avoid disappointing the public, but insists that he nevertheless has genuine psi power. Crussard remains convinced that Girard has such power. He told me that Randi had it too but refused to acknowledge the fact, and had used it to inhibit Girard's power last June.

Everyone knows that Randi travels a great deal. It is high time for him to admit that he travels on a flying carpet!

The CSICP Conducts a Test of Psychokinesis

Professor John Hasted, of Birkbeck College, London, has criticized the CSICP, and this writer in particular, for improper design of a test conducted June 12, 1977, at the University of Bath, England. This is a report of the conditions, conduct, and conclusions of this test. The reader may judge whether or not the claim of Professor Hasted is correct when he says in a letter to the December 1977 *Journal of the Society for Psychical Research* that the test was done "under rather complicated protocol, which no doubt did not greatly assist the spontaneous phenomenon."

From the beginning, every effort was made to keep the rules for the test as simple and direct as possible. I was in England briefly, having committee business in France; and in passing through on my way back, I visited Bath in the company of Mr. Michael Hutchinson, who has assited the CSICP greatly in the U.K., doing research for various projects there. I received a number of calls from Mrs. John Hasted asking me to visit Bath, and I made the time to do so at her request. Hasted himself referred to it as "an urgent matter." I was to witness a test supervised by Harry Collins of the university, who had conducted other, less formal tests with other spoon-benders there. None of the tests had been positive. In fact, the children had been caught cheating, as reported in *New Scientist.*

The subject of this test was to be Judy Knowles, a young woman who Mrs. Hasted had assured me was able to perform on demand, and I was repeatedly assured as well that I would see proof of her powers on this occasion. I in turn told Mrs. Hasted that I would give

my personal check for $ 10,000 to Miss Knowles immediately upon her performance of a genuine paranormal feat, in accordance with my standing offer. But I assured her that the main purpose of my agreeing to test Knowles was to obtain proof for the CSICP that she was indeed able to perform as claimed.

In the *JSPR*, John Hasted has faulted Collin's experimental procedure, referring to it as "crude." This is simply not true. Hasted refused to participate, though he witnessed the test, and was therefore unaware that, contrary to what he claims, the spoons were marked secretly to prevent substitution, and the security was very tight. One need only read the protocol designed by Hasted on other occasions to know that ours was quite adequate in conrast to his.

Those participating were: Hary Collins, Bob Draper, Joseph Hanlon, Mrs. Hasted, Farooq Hussain, Michael Hutchinson, Judy Knowles, Mr. Pinch, and James Randi. Everyone agreed to the protocol in wirting before the test started. Should any of the observers believe that in protocol had been broken, that person was to announce it immediately, and a decision would be made on what do to. If protocol were broken, the run was to be considered void.

All but Pinch and Miss Knowles were designated "observers." Pinch was the "experimenter" and Miss Knowles the "subject." John Hasted was to deliver the subject to the test room, and sit away from her during the test.

The observers were located in one part of the room, separated from the test area by a "one-way" mirror. A video camera was aimed through the mirror, and registered on a videotape recorder, which we controlled. Miss Knowles sat at a table and a mirror was located to show a back view of her hand. A candle was present to provide "blacking" for the bowl of the spoon being used. A clock was constantly running in view of the camera.

Pinch was instructed to take a spoon from the control area to the test area in a sealed jar, after the spoon had been examined by the observers and approved. He was to remove the spoon in the camera's view, placing it upon the table after marking it with the candle blacking on the inside of the bowl. Miss. Knowles was to show her hands clean and the spoon bowl blacking intact, to the camera, after which the start of the test was announced. She was to hold the spoon without allowing her thumb or finger to touch the blacked surface. She was to hold the spoon in one hand only. Identi-

cal spoons had been tested and it was found that they could be bent if force was applied to the bowl. A bend *downwards* was to be accomplished, which if done by ordinary physical force, would disturb the blacking.

At the conclusion of a run, the spoon and hands would be shown to the camera, to show blacking intact and hands clean. Pinch would then bend the test spoon on camera, to show it was easily bent. This spoon was then marked, discarded, and not used again. It was to be replaced in the container, and returned to the control area.

A comparison spoon was kept on camera at all times, and properly marked as such. It was used to determine if the test spoon would fit closely against it, and an agreed-upon deviation was established that would be considered a "bend".

Hasted and Miss Knowles were in the test area, with Pinch able to pass back and forth as experimenter, and Hutchinson as well, to protect the interest of the CSICP by observing but not handling the articles.

The protocol was considered broken if (a) the test spoon went out of camera view, (b) both hands of subject touched the spoon at the same time, (c) spoon was touched to table, (d) anyone but Pinch or Miss Knowles touched the spoon during the test, (e) any other body touched the test spoon.

Miss Knowles refused to sign a statement agreeing to the use of her name in a written account of this test.

Conclusions

After two lengthy sessions, the subject abandoned the experiment. Hanlon, Hussain, Hutchinson, and Randi agreed that the subject had on this occasion been unable to perform paranormally. In contrast, the others stated that the results were "inconclusive." This difference in language reflects, I feel, the difference in attitude.

In the *JSPR* article, John Hasted makes two erroneous assumptions to prove that the writer is not a good observer. He puts in my mouth a claim that I am "a better witness than scientists" I have never said that, only that I am a better witness than *some* scientists. In fact, Collins, Draper, Pinch, Hanlon, Hussain, and Hasted *are* scientists : only Hutchinson and Randi are not. the protocol that was used was (a) scientific, (b) adequate to the purpose, (c) simple and direct, and (d) quite properly applied and adhered to. And under this

protocol, Miss Judy Knowles, who is able to perform successfully when *not* observed, *produced no results.*

Hanlon and Hussain were asked to serve as *pro tem* members of the CSICP, assisted by Hutchinson. This was a test conducted by the Committee for the Scientific Investigation of Claims of the Paranormal, and was announced as such in advance of the test. The test was negative.

We await another opportunity to test Miss Knowles.

(*The Skeptical Inquirer*—Vol. II No. 2,—Spring/Summer, 1978)

THE STATE OF ASTROLOGY

Under this heading "The State of Astrology. Where Are We Headed ?" 19 well-known U.S. astrologers recently gave views that tended to differ markedly from the usual bright optimism. According to them, astrology in the United States today is at a dead halt, in a stormy situation of uncertain outcome, generally of decreased quality, in a very sorry state, plagued by bickering, too commercial, not accepted by society, maturing, often a waste of time, insufficiently person-centred, too person-centered, making progress, too ingrown, in trouble, in chaos, ignorant of relevant disciplines, and best in the world for its sensitive understanding of the human condition.

The main need for a theoretical basis, more facts and better theories, qualified people to do research, wider horizons such as application to ecological issues, reintegration of the sacred and the scientific, rigorous scientific testing, more person-centerdness, investigation of underlying mechanisms, proper accreditation, new ideas, more professionalism, better accreditation, more sophistication, thorough testing, and scientific research. (The views in each category total less than 19 because some astrologers evaded the question).

Here the majority view is that astrology is in trouble and in need of proper testing. Perhaps the most heretical view came from John Townley, a respected, widely published astrologer with two decades of experience: "I would say that most of the accusers of astrology are probably correct. They think that astrologers are 100-percent charlatans, but I would bring it down to 90 percent. Not necessarily even intentional charlatans. But... they are suffering from the same failing. May be 50 percent of the people out there are deliberately selling hokum straight ahead."

(Source: Astro*Talk, May/June 1986)

16

Ghostbusters!

They don't wear funny uniforms, they don't store ectoplasm in the basement, and not one of them has ever been "slimed." They don't even have a video on MTV. Yet a recently formed group called the Southern California Skeptics (SCS), with a strong base of support among the Caltech community, has been remarkably successful in causing ghosts of one sort or another to evaporate. In so doing, they have literally walked through fire, and they have repeatedly exposed themselves to that most terrifying and voracious of modern apparitions—the American news media.

Affiliated with a national organization called the Committee for the Scientific Investigation of Claims of the Paranormal (aptly acronymed CSICOP), SCS has grown quickly in the few months of its existence. Its board of directors includes Caltech faculty members Murray Gell-Mann and Joseph Kirschvink, JPL's Albert R. Hibbs, professors from USC and UCLA, and professional magicians. The group's stated aim is to promote the fair and accurate investigations of claims of alleged paranormal occurrences and to disseminate the results of these investigations. SCS has staged a number of well-attended lectures and demonstrations on the Caltech campus on such subjects as psychic surgery, the Bermuda triangle, and Kirlian photography, and has received quite a bit of (mostly) favorable media attention.

> *Glendower:* I can call spirits from the vasty deep.
> *Hotspur:* Why, so can I, or so can any man;
> But will they come when you do call for them?
>
> — Shakespeare, Henry IV, Part I

But there have been some growing pains. The Skeptics' first foray onto local television was not a notable success. KABC's *Eye on L.A.* program invited SCS chairperson Al Seckel and several members of the board—Dennis Marks and Sandy Spillman (both magicians) and Ronald Crowley (formerly a Caltech visiting associate in physics and now a Cal State Fullerton professor)—to investigate

videotapes and still photographs, taken at a Westwood cemetery, that contained mysterious images of ghostly ectoplasm.

The videotape, made in dim light near a grave at the foot of a tree, showed odd fluctuations of light at the same time that a psychic who was present claimed to be sensing a lady ghost, dressed 1920s-style in a red hobble skirt. The still photograph, made near the same tree, contains several streamers of ectoplasmic light, apparently emanating from the grave itself. Given just 30 minutes to examine the evidence and interview the film crew before commenting, on camera, about their findings, the Skeptics were unable to find a simple explanation for the images. When the show was aired, the producers felt justified in calling the images not just "unexplained," but "unexplainable."

With just a little further investigation, however, the Skeptics were able to explain the unexplainable. The fluctuations in light in the videotape were caused by a camera operating below its threshold of sensitivity in the dim light. At an amplification factor of 64, tiny fluctuations in available light caused large fluctuations in the image. And the streamers of light in the still photo were the result of this camera being jerked while its shutter stuck open. Despite repeated requests, however, the show's producers refused to allow the Skeptics to present these findings.

Can one go upon hot coals, and his feet not be burned?

— Proverbs 6:28

The Southern California Skeptics received more favorable media coverage one recent spring Sunday when they staged a demonstration of firewalking at Caltech's football field. The bleachers were filled with spectators as over a hundred people walked on an eight foot bed of 1000°F coals, most emerging unscathed.

In recent months the airwaves have been filled with reports of firewalking exhibitions, staged by groups who, for fees ranging from a hundred to several thousand dollars, purport to teach participants the mind-over-body techniques that they claim are necessary for performing this apparently perilous stunt.

These firewalking seminars intrigued two ULCA professors — physicist Bernard J. Leikind and psychologist William J. McCarthy. Both members of the Southern California Skeptics, they were, well, skeptical to say the least and decided to put the seminar to the test. One evening last November McCarthy attended one of these semi-

nars in Burbank while Leikind waited outside. And then *both* walked safely on the coals, proving that the intensive, six-hour motivational seminar was unnecessary.

It turns out that the ability to walk on hot coals can be explained by physical law; it isn't necessary to resort to mysticism or any mysterious psychological process. The explanation depends on the difference between *temperature* and *heat*. Imagine a cake baking in an oven at 450°. You can reach your hand into the oven and touch the cake without being burned, but you'll be burned instantly if you touch the aluminium pan it's baking in. The pan and the cake are at exactly the same temperature, but the cake has a low heat capacity and poor thermal conductivity, while the pan has a high heat capacity and good thermal conductivity. The wood coals used in fire-walking demonstrations conduct heat poorly and, as long as a walker moves over them reasonably quickly, the feet will cool the coals more than the coals will heat the feet.

Skeptics laugh in order not to weep.

— Anatole France

Media attention has led to a rapid expansion in Skeptics society membership, but it has also led to more than a few crank calls. CSICOP founding member James Randi, the well-known magician who's also an SCS board member, has a standing offer of $ 10,000 for proof of any paranormal, supernatural or occult power demonstration under properly controlled conditions, and this too prompts some rather interesting conversations. One woman phoned SCS, for example, claiming to have the power to make it rain in her Seal Beach neighbourhood within any 24-hour period without fail. She was challenged to make it rain the very next day, but the next day was dry. She called back to say that it hadn't rained in Seal Beach because she had mistakenly caused it to rain in Louisiana, and she asked for SCS's "certificate of approval" so that she could be sent to Africa to help relieve the drought.

Another caller claimed that his pencil was omniscient and directed his hand, writing what it wished. Al Seckel thereupon asked the pencil to solve a simple math problem : the derivative of x^2. The all-knowing pencil apparently never took calculus, since it couldn't come up with the answer.

And another caller claimed to know for a fact that Bigfoot was real. When Seckel asked why Bigfoot has never been shot, given the

large number of hunters who have searched for him over the years, the caller replied that Bigfoot *had* been shot, and more than 500 times too. In that case, Seckel queried, why has a carcass never been found. "That's how we know he's paranormal," replied the caller.

The ultimate result of shielding men from
the effects of folly is to fill the world with fools.

— Herbert Spencer

While debunking fraudulent or misguided claims is fun and receives the greatest amount of media attention, most of the Skeptics would agree that debunking is not the main goal of the society. Al Hibbs, a senior staff scientist at JPL and a member of the board of the Southern California Skeptics, says, "the major goal is to encourage people to think about seemingly marvelous, mystical, and miraculous phenomena rather than just accepting the notion that they're supernatural. We're trying to encourage people to adopt a scientific attitude, to investigate a little bit. We're not particularly interested in debunking things, although if it comes to that, fine. The primary thing we want to do is encourage people to adopt a way of thinking, a scientific attitude to what happens in daily life, to doubt whether the answer first presented is the right one, to examine alternative explanations." In his position at JPL, Hibbs manages a group engaged in research and instrument development for future unmanned space missions. Given his involvement in astronomy, it's understandable that he has a particular interest in investigating the subject of astrology. "I'm a Libra," he says, "Libras don't believe in astrology."

An interesting perspective on the proper goals of the skeptics is provided by Murray Gell-Mann, the Robert Andrews Millikan Professor of Theoretical Physics and a member of the boards of both SCS and CSICOP. He says, "My friends and acquaintances in this movement choose to designate their particular targets as 'claims of the paranormal.' Most of these people share with me the belief that there is no such thing as the paranormal. That is to say, whatever actually happens in fact can be described within the framework of science. If something new is found that doesn't fit with our present laws of science, we wouldn't throw up our hands. What we would do is to enlarge or otherwise modify the laws of science to incorporate the new phenomenon.

"That puts us in a strange logical position if what we are doing is investigating claims of the paranormal, because in the end nothing

is paranormal. It means, basically, that what we are doing is encouraging the skeptical examination of screwy phenomena in general, and some of them are bound to turn out to be basically genuine. So the debunking spirit, while it's entirely appropriate for most of these things, is not a perfectly satisfactory general approach.

"There's a classification of genuineness that's useful here. First of all there are things that turn out to be caused by conscious fraud — psychic surgery, things of that kind. Next, we have results of error but not demonstrably conscious fraud." According to Gell-Mann, many superstitious beliefs fall into this category and have as their basis, "poor or mistaken observations, a tendency to remember evidence in favor of a hypothesis, bad statistics, and lack of care in searching for natural explanations.

"Then we can go on from these classes of claims that are basically false to claims that turn out to be true. Some of them have simple explanations from physical science, as turned out to be the case for firewalking. There, the most important result is that firewalking is perfectly possible. It's not a false claim; it's not a psychosomatic effect; it's simply a physical one.

"But there are some phenomena that apparently *are* of the psychosomatic category. The placebo effect (in which objectively worthless treatments help in fighting serious disease) is the most famous. To reduce something to the placebo effect is not to show that it's unimportant or not there. The placebo effect is one of the most important in medicine and needs to be better understood. There are, of course, also some remarkable genuine effects that are biological or psychological in character but not psychosomatic.

"To go further, what about claims that would require, if they were substantiated, some quite novel ideas that are unfamiliar to science? And those claims I would attempt to classify into two kinds: those that involve very complicated environmental situations where we don't know for sure what the results of the fundamental underlying laws of science would be, and those that seem to require the revision of the most fundamental laws."

In the first of these categories, Gell-Mann puts the famous historical case of the meteorites. For hundreds of years scientists scoffed at the seemingly ridiculous idea that rocks could fall from the sky. This disbelief persisted until 1803, when an undeniable shower of stones fell on L'Aigle, a town close to Paris and close, therefore, to

the leading scientists of the day. According to Gell-Mann, a modern example of this may be, "the persistent, although rare, reports of falls of fish and other relatively large creatures from the sky. The anecdotal reports are relatively consistent, come from reliable observers, and may well be true. And meteorology contains enough richness that they can probably be explained. We should not, in such a complicated situation, reject the possibility of something being true because we can't think of a mechanism based on the fundamental laws we know. We shouldn't try to debunk it. We should go out and study the evidence and see if there is such a thing. We should be skeptical, of course, but there's no reason to adopt what I call the 'debunking mode'.

"Finally we get to the last category—those phenomena that seem, as far as we can tell, to contradict the most fundamental principles and would require, if genuine, really major revisions of scientific law. For these, of course, we must have a very healthy dose of skepticism. Probably most phenomena that would be described by the name extrasensory perception would be in this category if they turned out to be true, which I think is extremly unlikely. But these reports, persistent as they are, should be examined, to see what comes out of them. And, of course, the usual methods of the skeptic have to be applied. Although it's likely that phenomena of that sort will dissolve under skeptical examination, we should bear in mind the possibility that some might survive and find explanation in new scientific laws.

"Suppose, for example, it turned out to be true, as is often claimed, that pairs of people linked by special bonds, such as identical twins or mother and daughter, can communicate with each other telepathically, almost independently of distance, in moments of stress. We would have to start formulating and testing scientific hypotheses about how that could occur. Is there, for example, some new kind of material cord connecting such people, which gets 'twitched' at times of great anguish? Of course, it is most likely that nothing is there except chance and selective recollection.

"The whole notion of dealing with the paranormal dissolves a little bit under this analysis. We should encourage the study of all kinds of claims, with different doses of skepticism in different cases, and try to see what comes out of careful observation. When it looks as if conscious fraud is involved, with people being exploited to their

harm, as in the case of psychic surgery, debunking is the right mind set, the right tone of voice. In other cases, it's a question of showing how thin the evidence is. In still others, we may want to pursue the matter vigorously to see if there is not really something in it, whether simple natural science, sophisticated natural science, complex environmental science, or (what is very improbable) a major revision of fundamental scientific laws. In certain cases, it is the gullibility or trickiness of people involved that turns out to be interesting, or the preference for supernatural over scientific explanations, or the deliberate sensationalism of the news media.

"In all cases, though, I believe our emphasis should be on trying to understand what is going on"

> *The fact that a believer is happier than a sceptic is no more to the point than the fact that a drunken man is happier than a sober one. The happiness of credulity is a cheap and dangerous quality.*
>
> — George Bernard Shaw

> *The most costly of all follies is to believe passionately in the palpably not true. It is the chief occupation of mankind.*
>
> — H. L. Mencken

Why *do* people seem to prefer supernatural explanations? This is a question that interests many of the Skeptics. Gell-Mann says, "Great numbers of people believe in all these things with insufficient evidence either because they falsely believe there is sufficient evidence or, in more cases, because evidence is not an important criterion to their belief. In fact, many people state the matter in the following way: that one should believe what it makes one feel good to believe. This is not to say that such belief is worthless. Faith in things that are probably not true can be very powerful; it can, in some cases, give people strength or courage or a relaxed and confident attitude that permits them to accomplish tasks that would otherwise be too difficult. I would like to think that the same kinds of results can be achieved without belief in the supernatural." Hibbs advances the answer that magical thinking is a shortcut way of dealing with the world. "If you can make something happen just by thinking about it, that's much easier than having to go to work." And he also says, "Psychic phenomena have, always off there in the background, immortality, life after death, that magic thinking."

But those who have studied science realize that scientific explanations of natural phenomena are often far more elegant and far more beautiful than the most fanciful, magical, or supernatural inter-

pretations that people have concocted over the centuries. Perhaps the best thing to do is to recite, each night before going to bed, the ancient Scottish supplication that might be called the Skeptic's Prayer:

From ghoulies and ghosties and long-leggety beasties,
And things that go bump in the night, Good Lord deliver us!

— *RF*

(From *Engineering & Science*, May 1985)

JOURNALISM STUDENTS URGED TO EXAMINE PSEUDOSCIENCE

Can scientists do anything about the naivete and gullibility general newspaper and television reporters often show towards pseudoscience and fringe-science?

The Austin Society to Oppose Pseudoscience (ASTOP) thinks education is one answer. At its 39th regular meeting on August 20, 1984 it adopted unanimously a resolution recommending that the College of Communication at the University of Texas at Austin "require for its undergraduate degrees in communications a course similar to or equivalent to Physics 341, Pseudoscience, and that it recommend the taking of such a course to all graduate students in college."

In a letter on August 28 to Robert C. Jeffrey, dean of the college, Lawrence Cranberg, acting president of ASTOP and himself a physicist, noted that the resolution "represents the fruit of many months of discussion within the Society of the reasons for the widespread belief in pseudoscience in America, and the conclusion that the mass media, both print and electronic, must bear a very substantial share of the responsibility for this state of affairs".

It urged the University of Texas to become a pace-setter "in dealing with the problem of dissemination of superstition and pseudoscience by the media".

The course in question, Cranberg says, "is designed not only to expose the foibles of pseudoscience but at the same time to provide positive instruction in the basic principles of physical science and its methods." Cranberg told the SKEPTICAL INQUIRER that other, non-physical-science courses, such as those dealing in the scientific study of folklore, would also help "counter superstition and credulity among prospective journalists."

— Kendrick Frazier

17

Edgar Cayce: The Slipping Prophet

James Randi

When all else fails to convince the unbeliever, promoters of the paranormal fall back on the Sleeping Prophet, Edgar Cayce (pronounced Kay-see), who is credited with having given medical diagnoses of far-distant persons, with little or no information available to him, and "life readings" of people, when he was given only their names, describing their former and present lives. He claimed that it was all done while he slept and that he did not remember a word of what he had said while "in trance." The Association for Research and Enlightenment is the result of his wonderful work, and its library, with some 14,000 case histories, is great material with which to regale the credulous. In fact, the rationalizations that Cayce and his supporters gave for his notable failures are prime examples of the art.

Of course Cayce is remembered for his successes, not his failures. Disciples claim many thousands of verified "wins" in which the master psychic correctly diagnosed illnesses and prescribed cures. But *did* he? I refer readers interested in doing some original research to any of the many books about the Sleeping Prophet. It must be said of Cayce's followers that they are quite unashamed of the myriad half-truths, the evasive and garbled language, and the multiple "outs" that Cayce used in his readings. In some cases, these crutches are clearly stated, without any attempt to suppress them. But such is the belief of the zealot, that no matter how damning the evidence of the documents, faith marches on undaunted.

Cayce was fond of expressions like "I feel that" and "perhaps" to avoid positive declarations. It is a common tool in the psychic trade. Many of the letters he received—in fact most—contained specific details about the illnesses on which readings were required; the quest was for a cure.

There was nothing to stop Cayce from knowing the contents of the letters and using that information as if it were divine revelation. To one who has been through dozens of similar diagnoses, as I have, the methods are obvious. It is merely a specialized extension of the "cold reading" technique of the fortune-tellers.

His "cures" themselves are pretty funny, as you will see from an example I will quote. He just loved to have his patients boiling the most obscure roots and bark into nasty syrups. Perhaps the therapy was based on nauseating the victim so much that the original illness was forgotten. And it is no suprise that his cures are quite similar to "home remedies" described in the kind of handy medical encyclopedias that the late 1800s produced for the bedsides of every rural home. Beef broth was a favorite remedy with Cayce, for such diverse diseases as gout and leukemia. Who can fault a nice man who prescribes a cup of broth?

But were there actually cures from all this? The case is a hard one to prove, either way. First, the verifications that come back from patients hardly represent the whole. Remember that dead patients cannot complain; and for those who have not been cured, it serves little purpose to write back and grumble. After all, this good man has tried to help them and just because it didn't work in one case is no reason to knock the process. As for those who wrote and affirmed cures, there is an important factor to consider. I'm sure that you've heard the bit about the man who is found yelling at the top of his lungs in the park. Asked why, he replies that such a procedure keeps rogue elephants away. "But," counters this questioner, "there are no elephants around here for a thousand miles!" "See how well it works?" is the triumphant reply. The point is that just because Cayce prescribed a boiled root drink does not mean that that nostrum achieved the cure reported. Nor can we forget that many of the illnesses described to physicians are totally imaginary or self-terminating ones.

But can the skeptics prove that Cayce's cures are attributable to ordinary causes? It would require a huge expenditure of money to do the necessary research for such a job, and in most cases the information would not be available anyway. Frankly, the vague, evasive, and simplistic diagnoses and cures that Edgar Cayce is credited with hardly need such research. Examination of the record at hand is quite sufficient to deny him sainthood. The large and well-funded

organization that bears his name today survives as a result of preferred belief, not because of any adequate proof.

In a revealing book titled *The Outer Limits of Edgar Cayce's Power,* written by E. V. and H. L. Cayce, his notable failures are excused in typical fashion. The authors strongly assure us that the book, though it admits the failures, explains all of them quite satisfactorily. But I'll let you judge for yourself. Here, with the Cayce verbiage stripped away to the bare facts, is what they give us as an exercise in credulity.

The Hauptmann/Lindbergh case was a big boo-boo of Cayce's. These are the points he developed while in a trance:

1. The baby was removed at 8:30 from the Lindbergh home by one man. Another man took it, and there was a third person in the car.

2. The baby was taken to a small two-story brown house in a mill section near New Haven called Cardova. The house used to be green.

3. Schartest Street is mentioned, also Adams Street, which has had its numbers and name changed.

4. The house is shingled. Three men and one woman are with the child. The woman and one man were actually named.

5. The child's hair has been cut and dyed.

6. Cardova related to manufacturing of leather goods.

7. Red shale and new macadam road on "half-street" and "half-mile" are mentioned.

8. The boy has been moved to Jersey City and is not well.

9. Hauptmann is "only partly guilty." Cayce asks for "no publicity on this case."

Well, that's quite a bunch of facts, is it not? Unfortunately, they are all wrong. True. Adams Street was found, and it had been named only a few weeks previously. But this information was available to Cayce during one of his rare waking periods. Besides, Adams Street proved a dud. Said Cayce when confronted with the facts: "I've always had my doubts about anything very authentic in such matters." Well, so have I. Ed., more than ever before after examining your record. But we should give the disciples (and Cayce) a chance to rationalize this one, so here goes with a list of their excuses: (1) The readings picked up the mental plans of *others* who had *also* planned a kidnapping of the Linbergh baby. (Poor psychic aim.) (2) Thought patterns of others involved have distorted the readings. (3) Mental static was very heavy.

No wonder Cayce asked for no publicity. It was a real fiasco, and he had psychic egg on his face. But these excuses are accepted as quite legitimate by the believers—to this day.

But there are more surprises for us. Cayce even gave diagnoses of cases when the "patients" were *dead!* How could that be? Surely, dead is a very serious symptom, and should be detectable. But we have failed to take into account the ingenuity of the breed, as we will now see in two examples.

Cayce gave a reading on a Monday for Theodoria Alosio, a child who died of leukemia on Sunday, the day before. He gave a long and typical diagnosis, with a long and complicated cure involving diet. An example of the "reading" will suffice to show just how lucid and informative it is: "And this depends upon whether one of the things as intended to be done today is done or isn't done, see?" No, Eddie, I'm afraid I don't see at all.

The defendant deserves a chance at alibis, however, and we'll take a look at these in the case of the leukemia victim, which was diagnosed by Edgar Cayce with a lady aide, "conducted" by her cousin, recording the details. These are the alibis: (1) The person who sought the reading was not related to the child. (2) Only the child's mother had "an open mind." (3) The doctor in charge was not told about the reading. (How about the *coroner?* Yet what could either of them have done for the child even if they had known? The child was *dead*!) (4) There was "conflict between the recorder and her cousin at the time of the reading." (5) The steno recording the details was thinking about *another* little girl at the time. (6) The reading was given in reverse order, the physical check preceding the prescription. (Then, I ask, why didn't the great psychic detect *death* and skip the prescription?) (7) Cayce had been given a newspaper clipping for the week before, and had given a reading for *that* date. (8) The reading was given on *the condition*, not on the child herself. (9) Reading was given on "the period of seeking," not on the moment at hand. (10) in Cayce's own deathlear words: "If the proper consideration is given all facts and factors concerning each character of information sought, as has been given oft, the information answers that which is sought at the time in relationships to the conditions that exist in those forms through which the impressions are made for tangibility or for observation in the minds of others." (11) The reading given can be useful "for the next case." (12) Noth-

ing can be done except as God wills it. (Poor God, left holding the bag again). (13) The desire of the party was for a spectacular cure. (14) Leukemia is the focus of the subconscious, rather than the child. (15) The attitudes, desires, purposes, and motives of the patient and the person conducting the reading had a bad influence.

Is that enough rationalization for one big boo-boo? Apparently it is, for the Cayce folks have accepted it. But let me regale you with one more example of Cayce's medical prowess. For another *dead patient,* Cayce prescribed the following noxious mixture: Boil together some wild cherry bark, sarsaparilla root, wild ginger, Indian turnip, wild ginseng, prickly ash bark, buchu leaves, and mandrake root. Add grain alcohol and tolu balsam to the mess, and give it—during waking periods was specified—for 10 days. I've consulted my own (nonpsychic) physician, and he commented that such a mixture just *might* raise the dead. And note the preponderance of "wild" ingredients. How basic and natural it all sounds.

Rationalization time again. Say the disciples about this case: (1) No definite appointment was made for this reading. (2) The conductor of the reading held the letter—written while the patient was alive—in her hand during the reading. (3) The patient herself did not request the reading, thus a lack of direct need from her. (4) Cayce was emotionally upset that day.

I am reminded of the old story wherein the lady at the funeral calls out, "Give him some chicken soup!" Told that such a remedy would not help at this late stage, she correctly replies "Well, it couldn't *hurt.*" More grist for the believer's mill.

In a valiant attempt to prove Cayce's batting average in his "readings," the authors of *The Outer Limits of Edgar Cayce's Power* did a jolly bit of research at the association's library at Virginia Beach. They selected, at random, 150 cases from the files, and tabulated them. Their findings, they reported, showed *more than 85 percent successes* for Cayce, verified by actual reports of the cured patients! Quite impressive, if true, and certainly indicative of some marvelous psychic powers. But again, as you might have suspected, close examination shows a somewhat different conclusion. They listed them thusly:

No reports made	74	50%	(actually 49.3%)
Negative reports made	11	7%	(actually 7.3%)
Positive reports made	65	43%	(actually 43.3%)
	150	100%	100.0%

Then, they reasoned, since the "no reports" portion was impossible to judge, this got discarded, and the final table looks like this:

Negative reports	— 11/76	— 14.4% (actually 14.5%)
Positive reports	— 65/76	— 85.5%

So the results are rather remarkable by *their* figuring. If I here cries of "Unfair!" about now, I fully concur. And I object as well to the specialized terminology they use to describe the 11 negative reports. They are not called "failures" or even "errors"—they are referred to as "considered inadequate."

But we need to look into these figures even further, as did the two writers we are quoting. They tell us that 46 of these 150 persons *were present* at the readings; and of those remaining who were not present, 35 did not give any information in their letters appealing for help. Thus, 69 persons of the 150 *did* give information to Cayce. Now, you and I would agree, I'm sure, that prophet Edgar Cayce, with the patient present, has a much greater chance of telling something about the illness involved, as well as about many other factors that can surely be worked into the "reading" as evidential. So in a total of 115 (46 + 69) of the 150 cases, it was possible to make excellent statement about them, and probably get a "positive" report thereby. That's a big 76.6 percent, friends.

Another point: Why did the 74 cases *make no report?* Remember, they almost *had* to be believers in Cayce to ask for a reading. It was their lives they were dealing with. Does anyone seriously think they would respond with a negative report? *Or fail to send in grateful thanks and affirmation for a success?* Not very likely! So, we may safely assume that the majority of the 74 "no report" cases were *not successes*—pardon me, were "considered inadequate."

Even if we are exceedingly liberal with these folks and give them 50 percent of the 74 "no reports" as "positives," their 85.5 percent suddenly shrinks to 68 percent. But I refuse to do that, because I maintain that my argument on the probable reasons behind the "no reports" is correct. They are stuck with a bad analysis: and to make it worse, in their book they proceed to multiply this sample of just over *one percent* of the data by 100 to arrive at totally misrepresentative figures.

My own (admittedly amateur) analysis says that only 23.3 percent of the sampe has any hope of being demonstrably positive at all; and knowing the criteria and the quality of the data, that small percentage shrinks even further.

Before we leave the Sleeping Prophet to his permanent nap, it would be well to deal with one other of his supposed powers, one which is always thrown up in discussions as a heavy proof of his abilities. There is one field—locating buried treasure—that would seem to be safe against most fraud or second-guessing. After all, if a "psychic" can locate long-lost or long-secreted treasure, fakery seems impossible. In his attempts at this miracle, Cayce took no chances. He called in Henry Gross, the famous dowser who put his forked stick to work along with Cayce's powers to find purported millions in jewels and coins buried along the seashore. It was a little like setting out to sea in a leaky boat, then at the last minute throwing in some cast-iron life-belts.

Presumably, Edgar Cayce dozed while Henry Gross dowsed, wearing out several sticks in the process. They dug up tons of mud, sand, and gravel, looked under rocks, and in general disturbed the landscape something awful. No treasure. Weeks of work gave them only blisters. How could such a powerful team of psychic plus dowser fail to locate the prize? Rely on the alibi-manufacturers to come up with something suitable: (1) The psychic impressions were picked up from the spirits of departed Indians and pirates, and such undependable types are known to want to play jokes on the living. (2) May be the treasure *was* there, but had been moved. Cayce was reading in the past again. (3) There were doubts, fears, and cross-purposes at work among the seekers. (4) Were the directions Cayce gave based on readings from "true" North, or compass North? (5) Was the information given to Cayce meant for digging *now*, or another time? Perhaps in the *future?*

Well, there it is. The matter of Edgar Cayce boils down to a vague mass of garbled data, interpreted by true believers who have a heavy interest in the acceptance of the claims. Put to the test, Cayce was found to be bereft of real powers. His reputation today rests upon poor and deceptive reporting of the claims made by him and his followers, and such claims do not stand up to examination. Read the literature, with these comments in mind, and the conclusion is inescapable. It just ain't so.

(*The Skeptical Inquirer*—Vol. IV, No. 1—Fall 1979)

18

The Responsibilities of the Media and Paranormal Claims

Paul Kurtz

The Committee for the Scientific Investigation of Claims of the Paranormal was founded when a number of scientific skeptics and rationalists, increasingly concerned about the rising tide of unchallenged paranormal claims, decided to form a coalition of individuals committed to the use of science and rational methods of inquiry in evaluating such claims.

The word *paranormal* was being loosely used (we did not invent the term) to include many diverse things under its rubric; everything from psychic prophecies, ESP, clairvoyance, telepathy, psychokinesis, apparitions, hauntings, poltergeists, communication with discarnate spirits, reincarnation, levitation, psychic healings, on the one hand, to astrological charts and horoscopes, UFO sightings and abductions. Bermuda Triangles, and monsters of the deep, on the other. We thought it incredible that so many films, TV and radio programs, news stories, and books were presenting these paranormal claims as the gospel truth, even maintaining that they had been proven by science, and that there was little or no public awareness of the fact that when these claims were subjected to careful scientific appraisal they were shown to be either unverified or false.

We found the paranormal field so rife with wishful and exaggerated claims that we felt the public should have the opportunity to learn about dissenting scientific studies and thus have a more balanced picture. With this in mind, we launched CSICOP and a new journal, *The Zetetic*, which after the first two issues became the SKEPTICAL INQUIRER. We were committed to giving an impartial hearing to claims of the paranormal and to making our findings available to the general public.

CSICOP was and still remains a grassroots movement. Little

did we imagine when we began that we would grow so rapidly, that we would stimulate the formation of affiliated groups in ten other countries throughout the world, that local and regional groups would spring up all over the United States, and that the SKEPTICAL INQUIRER, under the masterful editorship of Kendrick Frazier, would reach close to 23,000 circulation and still be growing rapidly. Nor did we anticipate the attention we would draw—pro and con—from the media, the public, and our fellow scientists. We apparently have crystallized a deep-felt need, particularly in the academic and scientific community.

We are today witness to a breathtaking scientific and tecnological advance. Yet the scientific revolution is a relatively new development. Since its beginning in the sixteenth century, it has transformed the globe and radically altered human society. It led to the industrial revolution and the development of electronic and computer technology. It has given us the conveniences of modern life, made rapid communications and travel possible, including the great adventure into space. Scientific progress has dramatically increased food production, enabled us to control many diseases, and has contributed enormously to the betterment of the human life. For large sectors of the pupulation, science is simply equated with the latest technological innovations, which are gladly accepted because of their economic benefits.

Unfortunately, the public is often unaware of, or does not accept, other equally significant aspects of the scientific revolution. First there is the challenge of new intellectual conceptions of nature. Our planet is no longer the center of the universe, whose estimated age and size have been expanded tremendously. All life forms, including the human species, are part of nature, not separate from it, and have evolved over a long period of time. Our perspectives on nature and life are constantly being revised as the frontiers of science grow. Yet, in spite of this, ancient primitive, animistic, mythological, and occult views still prevail.

Second, and often overlooked by the public, is the fact that modern science was made possible by the development of powerful new methods of inquiry. Although techniques and procedures may vary from field to field and subtle social and psychological factors intervene in the development of science, still the process of scientific investigation emphasizes certain basic methodological criteria:

(a) the use of experimental methods for testing hypotheses, the insistence upon verification, prediction, and replication, and (b) the use of deductive inferences in validating mathematical and theoretical constructs and in explaining the observed data.

Intrinsic to scientific investigation is some element of skepticism. This means that we need to pay diligent attention to the facts, including novel, discordant, and anomalous data that do not fit into the existing parameters of explanations. One cannot rely on an appeal to the authorities. However well-respected they may be, they may be mistaken. Thus intrinsic to science is the self-corrective process whereby earlier hypotheses and theories are revised in the light of new data and new explanations. Scientific knowledge cannot be taken as absolutely fixed or final. Although there may be fairly reliable degrees of certainty, it is in the last analysis only hypothetical, tentative, probable. Unorthodox claims to truth may turn out to be correct in the end; they must not be peremptorily rejected. Before hypotheses can be accepted, however, they must be subjected to rigorous scrutiny by a community of objective inquirers.

It is puzzling that, given the tremendous boon the scientific revolution has been to world civilizations, many people have failed to understand its implications regarding the formulation of new conceptual outlooks, its unsettling effect on old faiths and beliefs based on prescientific prejudice and habits, and the importance of the scientific method in testing truth claims. Perhaps this is one of the reasons there still persist in contemporary society so many occult, spiritualistic, and paranormal notions of reality.

What can we do to correct this deficiency? Let me identify some directions I submit we should take. First, I think it is an important task of education to convey to students these two senses of sicence. However, it is not simply science as it is currently taught. Today science is taken as a technical speciality, and graduates of professional schools are credentialed primarily for their expertise in their chosen fields. Alas, as Emerson observed long ago, we are training men and women who know only a small corner of the spectrum of knowledge and are largely ignorant of the broader implications—and, I might add, do not know how to apply the methods of critical scientific inquiry to fields outside of their own disciplines. The Institute for Creation Research, for example, has several hundred chemists, engineers, and other specialists with advanced degrees affiliated with it,

no doubt competent in their own subjects yet unable to apply the methods of critical scientific intelligence beyond their fields of expertise. I would suggest that it is not enough to train narrow specialists and technicians; both science and nonscience majors must be exposed to general education, and in particular science needs to be understood as one of the creative and liberating arts. We need to ask. Can the general methods of scientific inquiry serve as a model for other fields of human interest? Philosophers have explored the possibilities of extending the tentative evidential and rational approach used in science to other areas in which we formulate our beliefs and evaluate claims to truth. Today we are confronted by various forms of anti-intellectualism, even among college graduates, that abandon any pretense to objective, reflective, or critical inquiry and substitute faith, subjective prejudice, or occult thinking.

We are also faced with the dominant influence of the media in forming attitudes and beliefs; for the growth of widespread belief in paranormal, pseudoscientific, and other untested claims may be traced in large measure to the distorted presentation that appears on television, in films, and in print. In other words, many people accept psychic, astrological, or UFOlogical reports as true because of what they have seen, heard, or read in the media. Much misinformation and exaggeration can be traced to the desks of editors, journalists, publishers, program directors, and film producers.

One question often raised is, How shall people in the scientific and academic community respond to the challenge of paranormal claims? The response should be, first and foremost, "By scientific research." In other words, what we need is open-minded, dispassionate, and continuing investigation of claims and hypotheses in the paranormal realm. Here one must be fair-minded and one should work cooperatively—as Marcello Truzzi has pointed out—with the so-called paranormalists. The dogmatic refusal to entertain the possibility of the reality of anomalous phenomena has no place in the serious scientific context. The hypotheses and data must be dealt with as objectively as possible, without preconceived ideas or prejudices that would mean the death of the scientific spirit. We cannot reject unconventional or outrageous ideas simply because they are unfamiliar or upsetting to our existing theories. They may after all turn out to be true. Their proof or disproof is found by doing the hard work of scientific investigation.

Unfortunately, the paranormal realm does not always lend itself to a dispassionate withdrawal into the quiet laboratory or library. For the paranormal is of such vital public interest that is immediately becomes news. Reporters are constantly sniffing at the heels of the parapsychologists and are ever-ready to take the most slender shred of evidence or the mere inkling that something may be true, inflate it out of proportion to its tentative epistemological status, and proclaim it as proven scientific dictum. In the paranormal realm, tentative hypotheses are readily converted into proven truths by overzealous reporters more interested in entertaining the public than in providing accurate information.

The media often behave totally irresponsibly in treating "paranormal" occurrences. This can be illustrated by two cases concerning paranormal powers that surfaced in the past year and were given a great deal of media attention. The first concerns the Columbus, Ohio, poltergeist (SI, Summer 1984 and Spring 1985), and the second, the reports of a psychic arms race.

In the first case, Tina Resch, a fourteen-year-old emotionally disturbed adolescent, a school dropout, and the adopted daughter of John and Joan Resch, became the central figure. The drama began when lights started to go off and on mysteriously in the Resch home and objects flew about whenever Tina was present. Finally a reporter, Mike Harden, and a photographer, Fred Shannon, both from the *Columbus Dispatch*, appeared at the house. Shannon took several photographs of a phone flying through the air (later called "the attack of the killer phone"). The phone would not take off, he reported, when he had his camera directly on it; the "force" eluded him. But he got the best of it by turning his head and peeking out of the corner of his eye. Then, as he glimpsed it flying through the air, he turned and got a shot. Mike Harden backed him up, maintaining that there was no known explanation for why phones, eggs, knives, cups, and lamps were flying all over; only a paranormal one seemed to suffice.

Shannon's photograph and Harden's story hit the newspapers worldwide; many even front-paged the photo. "Poltergeists!" they said, in banner headlines. At this point, CSICOP was besieged by the media; What was our view? We questioned most of the principals. We even sent a three-man team (Randi and Professors Shore and Sanduleak) to Columbus to do field research, but they were refused

admittance to the house by the Resches.

After extensive analysis, we concluded that Tina cheated. There were TV tapes to prove it. She was seen knocking down a lamp when she thought no one was watching and when she was unaware that the tape was rolling. When confronted with this evidence, Tina admitted trickery but said that she was tired and just wanted the news crews to leave the house. Incredibly, this explanation was readily accepted by Harden and other reporters and, even though the TV tape was shown on the Columbus newscast, camera crews and the news services continued to spew out a steady flow of poltergeist stories.

The Resch family permitted a parapsychologist from Durham to enter the house and to take Tina back to North Carolina for further testing. The parapsychologist, William Roll, admits that Tina cheated but also believes that she has genuine "psychokinetic energies" and that he observed objects flying through the air.

We in CSICOP who investigated the case are convinced that the entire affair was based on sleight of hand and fraud—and an analysis of the Shannon photographs confirms this interpretation. Tina has since admitted that she had seen the film *Poltergeist* many times; she also claims to have "healing powers". She has subsequently been shown to have cheated on other occasions by throwing things in the air when no one was looking. Yet the *Columbus Dispatch* has continued to give the paranormal interpretation. Indeed, the editor refused to give the SKEPTICAL INQUIRER permission to print the original photographs with the expose of the case written by James Randi. Whichever interpretation is correct, in our view at least, the media, and especially the *Columbus Dispatch*, behaved outrageously. There is one notable exception in this case; Davyd Yost, a reporter on the rival Columbus newspaper, the *Citizen Dispatch*, provided a balanced analysis of the case to readers in his area.

The second media buildup concerns the so-called psychic arms race, which was reported during the past year by news sources as diverse as Jack Anderson, *Time*, the Associated Press, and even the *New York Times*. The claim is that "remote viewing" and "psychokinesis" have been decisively demonstrated in the laboratory and that psychics have been successfully used to locate enemy submarines and missile bases. Moreover, it is alleged that both the United States and the Soviet Union are competing in such research. What are we to

make of this? Three books were published in the past year touting the use of psychics by the military. Has there been balanced reporting? Unfortunately, sensationalism has been the rule rather than the exception, and the so-called psychic arms race is largely a media event exaggereated out of all proportion to the actual facts.

Other cases of blatant misreporting arise all too frequently, such as the many stories on the Hudson Valley UFO sightings, which were reported on at length in the November 1984 *Discover* magazine as a hoax. But this was a notable exception to the many early stories that had heralded the phenomena as genuine extraterrestrial visitors.

CSICOP believes in freedom of expression. We do not believe in censorship. We ask only that those charged with supplying our news exert some form of responsibility and perhaps skepticism in reporting it, particularly when issues of scientific accuracy are at stake. We ask only for balanced reporting.

In conclusion, we need to pay serious attention to the way our journalists are educated, particularly in the area of science reporting, and how they are selected for their important positions. The media are so central to contemporary life that only the highest standards of selection and peer review should apply; the same rigorous standards that we use in selecting doctors, lawyers, and professors need to be employed in selecting our reporters and radio talkshow moderators. We have no desire to limit the discussion but only to improve its quality.

Here, of course, the colleges and universities have a vital role in educating future journalists. Some writers appear to be illiterate in even the most elementary understanding of science and of the means of evaluating truth and falsity. They ignore the standards of responsible journalism and often sensationalise the news to ensure conspicuous placement of their stories. This indictment does not apply to many or most science writers or to the many experienced journalists who recognize their responsibility to report accurately, and I don't mean it as a blanket indictment of everyone in the media. But it does apply to all too many journalists and reporters.

I should add that the problem of media misinformation also applies to politics, business, religion, ethics, medicine, and other topics of vital social concern. CSICOP is primarily interested in the reporting of the paranormal and pseudosciences, but what happens

in these areas is perhaps symptomatic of the broader problem—the need to develop in both the journalistic fraternity and the public some sort of appreciation for critical and reflective judgment in evaluating claims of truth. This need is made more critical by the fact that the public is constantly being bombarded by those who wish to promote their own views, sell a bill of goods, convert others to a cause, or convince us that they have discovered a special truth or have found a unique road to salvation.

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HOW IS TRUTH TO BE FOUND?

By investigation, experiment and reason. Every human being should be allowed to investigate to the extent of his desire-his ability. The literature of the world should be open to him—nothing prohibited, sealed or hidden. No subject can be too sacred to be understood. Each person should be allowed to reach his own conclusions and to speak his honest thought.

He who threatens the investigator with punishment here, or hereafter, is an enemy of the human race. And he who tries to bribe the investigator with the promise of eternal joy is a traitor to his fellow-men.

There is no real investigation without freedom—freedom from the fear of gods and men.

So, all investigation—all experiment—should be pursued in the light of reason.

— Robert Green Ingersoll

19

Karnataka Government's Investigation of Banamathi

– Extracts from the report

Banamathi is supposed to be a kind of witchcraft widely prevalent in Gulbarga and Bidar Districts. It is said that this alleged witch craft has been in existence for the past several decades. It is also mentioned that many years ago the then Nizam Government had even constituted a 'Banamathi Squad' to deal with the persons who were accused of practising Banamathi. The ill effects of Banamathi are both mental and physical. The victims undergo a lot of suffering on account of this alleged witchcraft.

Such sufferings of a number of villagers in Gulbarga and Bidar Districts in general and Pasthapur Village in particular were high lighted in a few local newspapers in May-June 1980. This issue was raised in the Karnataka Legislative Council through a Calling Attention notice in July 1980 when I was a member. Serious concern was expressed by many members of the Council and there was a persistent demand for the investigation of the phenomena scientifically. The Minister for Revenue who was also the Leader of the House, while replying to the debate agreed to the constitution of such a committee. Accordingly, the following Committee was constituted by the Government in the Order No. H.D. 35 PLQ 80, Bangalore, dated 11th August 1980.

1. Dr. H. NARASIMHAIAH Former Vice Chancellor & Professor of Physics	Scientist & M.L.C.	*Chairman*
2. Dr. G. N. REDDY Prof. & Head of the Dept. of Medicine, St. John's Medical College.	Physician	*Member*
3. Dr. (Mrs.) VINODA N. MURTHY Prof. & Head of the Dept. of Psychology, Bangalore University	Psychologist	*Member*

4. Dr. H. S. NARAYANAN Associate Professor of Psychiatry, National Institute of Mental Health & Neuro-Sciences.	Psychiatrist	*Member*
5. Sri. S. MALLIKARJUNAIAH	M.L.C.	*Member*
6. Sri ABDUL NAZEER SAB	M.L.C.	*Member*
7. Sri M. C. PERUMAL	M.L.C.	*Member*

The first meeting of the Committee was held on 22-9-1980. There were detailed discussions as to the procedure to be adopted to do the investigation. The Committee resolved to collect information from persons who are either victims of Banamathi or who can throw some light on it. It was also resolved to call for such information by notifying it in the local newspapers and also through A.I.R. Broadcasts from the Gulbarga and Dharwar Stations. It was also decided to get the necessary information about this phenomenon from the Police Officials of Gulbarga and Bidar Districts.

Accordingly, there was an advertisement requesting for information about Banamathi and also co-operation from the public in its investigation. The advertisement appeared in the newspapers Deccan Herald, Prajavani, Indian Express & Kannada Prabha. The public were requested to pass on the information before the end of October 1980. This request for information was made in mofusil papers published from Gulbarga also. The A.I.R. at Gulbarga made periodical announcements regarding this subject as requested.

The Committee received about 70 letters communicating data about the occurrence of Banamathi and accounts of the suffering of its victims. The Committee considered the data in detail and decided to visit a few places in Gulbarga District and in particular Pasthapur village which was considered to be afflicted by this phenomenon to a large extent.

It was decided to take the assistance of two doctors in the Department of Psychiatry, National Institute of Mental Health and Neuro-sciences in the investigation. Accordingly, Dr. M. S. Keshavan, Lecturer in Psychiatry and Dr. B. N. Gangadharan, a Post graduate Resident in Psychiatry of the above Institute joined the team to assist in the investigation.

The team visited Pasthapur, Padasavali and Korahalli villages in Gulbarga district from 5th December 1980 to 9th December 1980.

A total of 19 people were examined in great detail which included 11 women. The investigation comprised of detailed physical and psychiatric examination of the afflicted persons.

At the end of the investigation the Committee reviewed the collected information and the following preliminary conclusions were drawn.

The physical and behavioural changes reported in the victims appeared to be common physical and psychological illnesses encountered in any hospital. However, psychological illnesses are greatly prevalent. This is understandable in the background of widespread fear and strong beliefs in these areas. Suitable medications were indeed prescribed for some of the minor physical and psychological illnesses. The implications of the rest were explained to them.

Interviewing the different members of the family revealed that the brothers had considerable difference of opinion in the financial matters in running such a huge joint family. It is not uncommon that conflicts in a joint family manifest themselves in not only psychiatric disturbances but also in other ways to attract or divert the attention.

The Investigation Committee met on 16-12-1980 after its return from its first visit to Pasthapur and other villages to discuss the future course of action. Based on its experience it was decided to make an in-depth door-to-door survey of the village Pasthapur and also visit a few villages in Bidar District. In order to make this detailed survey it was resolved to get the help of about six Resident Psychiatrists from the National Institute of Mental Health and Neuro-Sciences. It was decided to visit those places from 5th January 1981 to 10th January 1981. Accordingly the following members participated in the investigation.

1. Dr. H. Narasimhaiah M.L.C.
2. Dr. H.S. Narayanan
2. Sri S. M. Mallikarjunaiah M.L.C.
4. Sri Abdul Nazeer Sab M.L.C.
5. Dr. M. S. Keshavan, Lecturer in Psychiatry, NIMHANS
6. Dr. C. R. Chandrasekhar, Psychiatrist, NIMHANS
7. Dr. H. N. Vidyasagar, Post Graduate Resident in Psyhiatry, NIMHANS
8. Dr. (Miss) Shoba Annaiah, Post Graduate Resident in Psychiatry, NIMHANS

9. Dr. Sanjeev, Post Graduate Resident in Psychiatry, NIMHANS
10. Dr. Somnath Chatterjee, Post Graduate Resident in Psychiatry, NIMHANS

The door-to-door survey of the Pasthapur village was made by the doctors of the above team from the 5th January 1981. All the members of the above team visited a number of villages in Bidar and Gulbarga Districts. The following table gives the names of the villages visited with the number of afflicted persons examined.

Place	*Number Examined*	*Place*	*Number Examined*
Pastapur —	37	Tojna —	20
Chincholi —	5	Nandinagar —	3
Salebeeranahalli —	8	Aurad —	10
Aranakallu —	6	Chidri —	35
Rajeswar —	8	Yadlapur —	35
Humnabad —	1	Benekanahalli —	57
	65		160

A Study of Pastapur Village

The village Pastapur is situated about 25 km. away from Chincholi. The road is quite unsatisfactory for motor vehicles and the village is remote from the main road. There are no lights in the houses, though there are a few street lights. Water facilities are recently made available by installing taps. Many people hesitated to use this water as they think that it is not good water. The houses are thatched by locally made stone tiles. Local sanitation is very poor, with dirty water stagnating on many roads. There is one mosque and a temple. Schooling is available till the fourth standard. The children have to walk a considerable distance to go to the nearest middle school. To get any medical help, people have to walk a similar long distance.

A detailed psychiatric and physical examination revealed that all the cases could be classified as follows.

Psychiatric		**Physical**	
Hysterical neurosis	18 (67%)	Asthma	2
Schizophrenia	1 (4%)	Migraine	1
Depressive neurosis	3 (11%)	Blindness (chronic iridocyclitis)	1
Obsessional neurosis	1 (4%)	Leprosy	1
Epilepsy	1 (4%)	Paraplegia	1
Mental retardation	3 (11%)	Syringomyelia	1
Total	27	Skin scars (Keru)	3
			10
		Total	37

Other reported Phenomena

1. Disappearance of objects i.e., Mangalasutram in women, silver toe rings, bangles, clothes, money, and other articles. Often, such objects were reported to reappear after varying periods of time.

2. Burning of clothes and spontaneous tearing of clothes.

3. Appearnace of objects like, kumkum, turmeric, lemons with or without nail and cashew seeds (keru seeds)

4. Falling of stones on the houses.

5. Drying up of trees.

6. An interesting phenomenon reported in Humnabad, attributed to Banamathi was that in a house when one door was forcibly moved a few adjacent doors also would rattle.

Certain phenomena were reported to happen among animals, too. A cow gave blood tinged milk. In another case nipples were found cut. In some cases cows were giving less yield of milk. Scars were found on the skin of cows. And some cows would stop taking fodder and even water.

A related phenomenon was the appearance of blackish painful scarmarks over some part of the bodies of human beings. They were of varying sizes and shapes. In Aurad, such a mark was found on a four month old child.

Regarding the appearance, disappearance, or destruction of objects, or of fall of stones, etc. despite intensive inquiry not a single report by any person of having directly witnessed such a phenomenon during its happening was forthcoming. Everyone would say that he had seen an object some time before, and after some time it was found missing. Many times, reports were by persons who were not there at the spot when the phenomena happened. For example, in one case, the team was told by a family about the burning of a sari in a room just a few minutes before the team arrived. The spot where the sari caught fire was adjacent to a burning hot oven. Another spot in the same house where clothes were reported to have caught fire was by the side of the niche in the wall meant for a lamp.

In Pastapur the villagers reported about an instance where two persons were actually caught when they were throwing stones. In Rajeshwar (Bidar District) a person was observed by the family members, while he was keeping lemons at the doorstep and running away.

It is well known that if either mercury or copper sulphate is put into the trunk of a tree, it will begin drying up. It is not difficult to inflict a wound in the udders of the cattle, cut their nipples or cause skin scars. Natural variations in the yield of milk among cattle, food intake, etc. are well known. The fact that even such normal acts are attributed to Banamathi shows their strong belief in it.

The rattling of adjacent doors of the house in Hamnabad when another door is closed or opened is an example of an understandable familiar physical phenomenon of transmitted vibration.

Scars found over the skins of many people in these areas are similar to scars produced by the corrosive juice of seeds of cashew. Cashew seeds are kept in nearly every house in these areas for removal of the effects of 'evil eye'. (On throwing these seeds into fire, they burn with a rattling sound, confirming their superstitious belief). Such scars have rarely been found on the parts of body not accessible to one's own hands—like the back.

It is quite likely that these are self induced skin lesions very similar to the fictitious dermatitis seen in the skin departments of hospitals.

It is wellknown in psychiatry that an illusion of actually seeing a phenomenon can indeed be experienced by a suggestible person with strong belief under intense fear and imagination. Some of the psychological disorders observed in the so called Banamathi can be explained on this basis.

Conclusions

Thus the Committee made careful and detailed investigations of a large number of cases. Besides, the Committee held discussions with a number of persons who were considered to be 'knowledgeable' on this subject.

People have been suffering from this so called witchcraft i.e. Banamathi due to various causes. Some of the prominent causes have been fear, ignorance, superstition, personal and family problems, poverty, religious feuds, and village politics. This phenomenon of Banamathi is more prevalent in remote villages cut away from the main stream of life. It is also a fact that most of the victims are women. Even among women those belonging to marriageable and child-bearing age groups seem to be more prone to this problem.

All the sufferings of the victims attributed to Banamathi fit into familiar patterns of mental and physical diseases. Most of these are

psychiatric cases. Many of these attacks were induced by a simple suggestion by the doctors and were also terminated by a similar suggestion. These people have been suffering from a variety of psychological disorders. Hysterical neurosis, a form of psychiatric disturbance, is the most common. This is characterised by episodes of abnormal behaviour, like screaming, developing fits, becoming unconscious, tearing away of clothes, inability to speak and so on. These are directly understandable in terms of strong socio-cultural beliefs, family and personal problems, poverty etc. It is common knowledge that such internal conflicts resulting in hysterical neurosis are found in other countries also. Their effects would be in accordance with the prevailing social and other conditions. In a few villages these psychological disturbances have assumed the form of 'mass hysteria' as witnessed in Yadlapur and in Benekanahalli villages. There are other kinds of neuroses like depression, obsession etc. from which some of the victims have been suffering.

The phenomenon of Banamathi as already mentioned has been in existence for decades and is deep rooted among some sections of the people in North Karnataka which formed part of the erstwhile Hyderabad State governed by the Nizam. This malady exists in some parts of the present Andhra Pradesh adjacent to Gulbarga and Bidar Districts also. The belief has been handed over from person to person and passed on from generation to generation. In fact, the belief in Banamathi is so deep rooted that even common physical ailments such as asthma, leprosy, tuberculosis, anaemia, and vitamin dificiency diseases are attributed to Banamathi. Susceptible and ignorant people have become so sensitive and scared that they think of suffering from the effects of Banamathi whenever they are not feeling well. The fact that even normal variations in the yeild of milk of a cow is also attributed to Banamathi shows to what extent the pernicious belief is deep seated in their minds.

The second category of the phenomena belongs to the appearance and disappearance of the objects, falling of stones, burning of sarees etc. It is very significant to note that nobody had ever witnessed those phenomena during the process of their actual occurrence. No body saw either the clothes catching fire or scars during the process of their marking. As already mentioned two persons were caught by the villagers when they were trying to throw stones. Besides, falling of stones is reported in many parts of the State and it

is also intersting to note that according to such reports there was no falling of stones when a vigil was kept. A careful scrutiny of these phenomena will lead to the conclusion that there is no evidence of the working of any supernatural force. Many of the phenomena attributed to Banamathi must have been deliberately performed by persons due to various reasons such as to attract attention, to get sympathy, or to avoid extra work. These are all of common occurrence familiar to the doctors in the field of psychology and psychiatry. It may not be out of place to mention that no body ever came forwad to perform 'Banamathi' on the members of the team when they publicly offered themselves as subjects on many an occasion!

Thus, based on a careful analysis of all the available data and a close and searching examination of a large number of victims, the Investigation Committee has come to the unanimous and firm conclusion that the so called Banamathi is not due to any supernatural cause.

It is a fact that there has been a lot of suffering on account of these mental and physical problems. It is also a fact that vested interests have been using Banamathi as a means of exploitation. Attributing these phenomena to supernatural causes they have been reaping a rich harvest. Some of the families are ruined on account of spending large amounts of money in the hope of getting a cure of the ill-effects. Poor villagers and gullible people are being cheated.

The Committee would like to point out certain strong supporting factors which have lent credance to belief in Banamathi. The fact that many educated people, officials and men of public importance implicitly believing in Banamathi has also been responsible for its continued widespread belief among large sections of villagers. As we know superstitions are widely prevalent in our country. All of us know that an educated superstitious person is more harmful to society than his uneducated counterpart. Besides, occasional, nay, frequent dubious and unscientific reports, articles, and statements in some newspapers tend to give a final seal of confirmation to the existence of some kind of witchcraft. In fact the phenomena attributed to Banamathi are not peculiar to places in Gulbarga or Bidar Districts. They are widespread in all parts of the state and the country. But they are called by different names. All these can be attributed to the same root causes excluding any supernatural force.

Another important reason for the spread of Banamathi is that the Police Department under its existing laws are helpless and can

not take notice of cases coming under the purview of Banamathi. This has indirectly given a free hand and also encouragement to persons who in the name of Banamathi scare innocent people and exploit them.

Recommendations

1. Since the effects of the so called Banamathi fall into the categories of well known mental disorders and physical ailments, the Government should immediately arrange for better Health Services in general, and Mental Health Services in particular in the areas afflicted with this phenomenon. It is learnt that there is only one psychiatrist in the entire Gulbarga District. There is a great need for posting psychiatrists and other mental health specialists in all the Hospitals in these Districts to treat the afflicted persons and to train other Health personnel.

2. Periodic psychiatric camps should be organised in those areas.

3. Absense of any law to take cognisance of cases coming under the supposed witchcraft etc. has given a free hand to cheats and thus has greatly encouraged them to exploit the poor and the gullible. Hence, the Committee strongly urges the Government to enact a Law to punish persons who claim to perform witchcraft, black magic, sorcery and such other evil practices to scare and cheat people. The committee would like to draw the attention of the Government to the fact that the British Parliament passed such a Witchcraft Act as early as in 1735 to prevent cheating in the name of witchcraft. Passing of such an act is of utmost importance since it will have a great deterrent effect on the spread of such evil practices.

4. Psychiatric orientation for the community health workers, general practitioners, nurses and medical personnel in Primary Health Centres should be given.

5. Systematic steps should be taken to educate the people taking the help of all forms of mass media, teachers and voluntary service organisations. People should be effectively told not to believe in Banamathi or any other kind of witchcraft as a supernatural phenomenon.

6. The Government should take necessary steps to include inculcation of scientific temper, eradication of superstitions etc. as a part of education starting from the school level.

7. Socio-economic conditions are to be improved in these

parts. There should be more schools, hospitals, protected water supply, better roads, and communication systems etc.

8. In spite of our findings based on scientific investigations that there is nothing supernatural in Banamathi, it will not be surprising if a large number of persons continue to believe in black magic, witchcraft etc. In order to weaken and remove such beliefs and expose such fraudulent acts the Government should constitute committees to investigate such phenomena scientifically as and when they come across such practices.

9. Again, in order to weaken and remove the belief of people in witchcraft etc. the Government should declare publicly the award of a handsome reward to any person who can scientifically prove the existence of such phenomena which invoke supernatural forces.

The Committee, having been keenly aware of the acute sufferings of the people, unanimously requests the Government kindly to take very early steps to implement the above recommendations. This will be of immense help not only to the afflicted people in some parts of North Karnataka but also in the larger interests of dispelling obscurantist beliefs extensively prevalent among superstitious and stagnant sections of our society.

The Committee would like to draw the attention of the Governments to the clause (h) of the Fundamental Duties of the Constitution of India which states,

"It shall be the duty of every citizen of India to develop scientific temper, humanism, the spirit of inquiry and reform."

Hence it is the duty and the responsibility of the Government to take all the necessary steps in the fulfilment of the above duty.

The Committee would like to congratulate the Government of Karnataka on taking a decision to investigate Banamathi scientifically. Our Government may be the first Government to take up such a study of a problem believed to be associated with supernatural forces. The Government has taken the first step in the right direction to know the truth scientifically and thus to reform society on a rational basis. The Committee fervently hopes that the Government should continue to proceed in the same direction firmly and systematically to rid our society of the pernicious superstitious practices which have been impeding the progress of our society. The Committee would like to state that there cannot be coexistence between science and superstition. The Committee is aware of the fact that age

old superstitious beliefs and practices cannot be removed in a short period. This process is bound to be slow. But effective, meaningful and persistent efforts should be made to usher in a rational society bereft of all kinds of superstitions which have been consuming considerable amounts of money, time and effort of the people. Besides, superstitions greatly damage the self confidence of the people.

(Extracts from the Banamathi Investigation Committee Report submitted to the Government on 2-3-1981).

EDITORS AND "CLAIRVOYANTS"

The real mystery concerning the future is how these quacks (self-proclaimed psychics and clairvoyants) continue to receive so much time on radio and television and so much space in newspapers and magazines. Editors responsible for running them don't require them to name sources or explain their information as they do when reporters, without any pipelines to spooks, turn in mundane accounts of current events.

* * * *

Gullible editors often give serious attention to orthodox magical tricks, such as the sealed envelope containing a prediction of the newspaper's headline, or the precocious horse able to count and do figures, or the mind reader able to dumfound even professional scientists. Several professional magicians, notably Harry Houdini and Joseph Dunninger, offered large rewards for any one who could produce an effect that they couldn't duplicate. Nobody ever won the wager, but clairvoyants and other quacks continue to thrive. Their task is easier in periods of economics insecurity as the present when many people turn to the supernatural for comfort.

— Curtis D. MacDougall,
Professor Emiratus of Journalism, Northwestern University

20

Scientific temper or Bondage of traditions

Pushpa M. Bhargava

The following story appeared in *Link* of 8th May 1983:

"On the afternoon of April 11, the District Magistrate of Gopalganj, Mahesh Prasad Narayan Sharma, was stepping down the stairs of his collectorate office when some stuff was thrown at him. Moments later, blood-strewn, he was lying at the bottom of the stairs, dead.

"The alleged assailant, Pramhans Chowdhary, made the initial confession that he had killed Sharma because Sharma had harassed his guru, Sant Gyaneshwar.

"Sant Gyaneshwar's story is not just another rags-to-riches story. Highly influenced by the so-called modern Indian godmen, particularly Balyogeshwar and Rajneesh, this law graduate of Deoria district, originally Sadanand Tripathi, decided to follow in the 'holy' footsteps of these godmen. In no time he became known as Sant Gyaneshwar.

"His potion for 'nirvana' was clear. He promised his 'bhakts' a 'darshan of god' if they were ready to 'surrender to him body, mind and wealth'. Soon he had a large following amongst the politicians and bureaucrats of eastern UP. And then began the talk about the Sant's 'special attention' to his women followers. According to the Hindi daily 'Aj', a case had been registered against him in Deoria for having allegedly murdered one of his 'chelas', Anand Bihari Sahay. According to the report, Sahay was killed when he objected to his wife's 'total submission' to the Sant, also known as the Baba.

According to the police records, District Magistrate Sharma first raided the Ashram some nine months back. He had recovered 30 girls hailing from various parts of the country, even from neighbouring Nepal. All had been sexually exploited, it was alleged, and

all of them wanted to go back home.

"Despite the fact that revealing stories had continued to be published in the local press, none of Sharma's predecessors had dared touch the Sant. Cases of encroachment on the public land had been lodged against him, yet he was not prosecuted. Had Sharma followed in the footsteps of his predecessors he would not have met such a gory end."

Our country abounds in similar incidents. And, why not? What else would one expect when Ministers and other senior politicians, senior scientists such as a past Scientific Adviser to the Ministry of Defence, Secretaries to the Government of India and to the State Governments (and other senior civil servants), educationists occupying senior positions such as many Vice-chancellors and Chairman of the University Grants Commission, and prominent citizens, believe in one godman or another, specially in their miraculous and magical powers? Why this obsession with the supernatural?

We adhere to totally irrational beliefs: astrology and homoeopathy, to mention two. The damage such beliefs cause is untold. Why do we find them so attractive?

We are a country in which there are no listeners. Everyone talks because he feels he knows everything. There is little desire to learn. No one is willing to accept that another individual, specially from a different caste, community, religion, state or background, could be better than him. Why?

There is, however, a common creed—the national creed—of selfishness, so much so that it is difficult to do something for some one else without being suspect as to the motives. Why so?

Practices such as dowry and bride-burning are rampant. So are customs such as child marriage, even though they are illegal. Hardly ever is the culprit punished even when we know who he is—for the culprits usually have access to power. What makes the privileged so arrogant that they may break the law with impunity.

Superstitions and irrational beliefs guide our life. They decide which day we shall travel, or do business, or join in a new job, or get married. If we had our way, we would also decide on which day we were to be born! The only time, perhaps we do not worry about the auspicious day, is when we wish to be corrupt or selfish. (According to our creed, every day is an auspicious day for corruption and exploitation!) Why this total submission to the irrational?

We in our country today, as a rule, *reject* what is scientifically established, tested and verifiable, but we *accept* on faith what is not. Why this disregard for evidence and proof?

Courage and discipline (which were the hallmark of the life of Mahatma Gandhi) are absent from the life and character of our people. The only courage we know is the courage to be corrupt and selfish, and the only discipline we know is that confined to the performance of rituals. Why?

Why is our life so circumscribed by these parameters of stagnation at the individual level? I submit that the lack of scientific temper or scientific outlook is one of the most important and crucial reasons.

The situation is much worse because, as a nation, on the face, we are committed to the scientific temper. It is a part of our duties as citizens, according to our constitution, but all that we manage to do, at most is to lip service to the scientific temper. What more can we do when almost everyone who is in power is in the heart of his heart, opposed to the scientific temper. Indeed, there is not a single example of concerted and organised governmental effort in the direction of inculcating the scientific temper in our country—or even encouraging it. The Government has, for example done nothing to prevent proliferation of godmen in the country. They exploit people and convert black money into white. If a man produceses a Swiss watch or a packet of notes worth, say, a lakh of rupees out of nowhere, to give to a devotee, that this is surely not taxable! For aren't all material goods produced in this manner, merely a manifestation of the sacred ash? What law prevents the government today, if it is committed to the scientific temper, to have this matter investigated? "People get relief when they visit such godmen. Why prevent them from this little satisfaction amidst so much deprivation", is an erroneous argument. We do not realise that lack of any defiance of or opposition to such godmen who are engaged essentially in the job of exploiting and cheating people, only consolidates the belief of people in the supernatural, and that such consolidation eventually makes them act irrationally in many other areas of life in which their actions affect a large number of other people.

I hope I have given above enough justification for the need to do every thing possible to inculcate scientific temper in our people, in our politicians, even in our scientists!

(Abridged article—*YOJANA*, August 15, 1983)

21

Teaching Critical Thinking

Kas Mazurek and Brian Titley

Readers of the SKEPTICAL INQUIRER certainly do not need to be reminded of the astounding varieties of what *Time*, echoing Charles Fair, dubbed "the new nonsense" (Dec. 12, 1977). Astral travel, psychic surgery, telekinesis, psychic phototelepathy, demon possession—the list is seemingly endless. That adults are entertaining, and succumbing to, many paranormal and pseudoscientific beliefs is becoming commonly recognized (*Psychology Today*, Oct. 1973; Feb. 1976). The resurgence of general public interest in parapsychology, astrology, the occult, and magic (*Time*, June 19, 1972) has given the new nonsense more of a public forum and therefore greater significance. Newspapers report almost daily how UFOs abound all over our globe. Uri Geller continues to receive media coverage. The Amazing Kreskin is a recurring personality on television. "Bermuda Triangle" is a "household word," Pyramid power spawns lucrative new commercial enterprises. Sensational crimes are supposedly solved by psychics. Newspapers carry syndicated daily horoscopes, biorhythm charts, and psychics' columns. Occult-book sales boom. The permeation of these beliefs is so extensive that we can conceive of, to use a borrowed phrase, "the occult revival as popular culture" (Truzzi 1974).

What is often not fully appreciated is the tremendous effect these ideas have upon children and adolescents. It is the young who are the least discriminating consumers of popular culture; and, if that culture includes the new nonsense, then obviously a constant regeneration in the ranks of believers is occurring. Certainly journals such as the SKEPTICAL INQUIRER are doing a tremendous service in the cause of fostering balanced, critical thinking. But we are concerned that those most in need of analytic skills—the young—are only marginal recipients of such lessons. The objectives of this article is to outline a simple, concrete method for fostering critical

thinking that we have invariably found to be an educational, stimulating, and rewarding experience for the youth involved.

Children and adolescents are highly curious, enthusiastic, and imaginative. This, combined with the fact that they possess an intellectual capability still in the formative stages, makes them particularly susceptible to even the most bizarre claims of the advocates of the paranormal and the practitioners of the pseudosciences. Three main processes combine to give the new nonsense credence in the minds of youth. Hearsay is one culprit. Stories are passed around, the tales grow in exaggeration and inaccuracy, and then the myths become common and accepted knowledge. This is a well-known social-psychological phenomenon, and the influence of peer pressure is greatest in the early years.

Second, and of even greater concern, is the realization that many irrational beliefs appear to be wholly legitimately supported. In a media-dominated world, children who insist upon the actuality of the Bermuda Triangle, the reality of pyramid power, or the accuracy of astrological projections are quick to refer to having seen it on TV, having read it in a book, or having seen it in the newspaper. This presents a problem for skeptical adults. When the media uses such terms as "Bermuda Triangle" freely, they are, in effect, creating an air of legitimacy. Logically, children conclude that there must be some truth to the matter if they see it in their local paper.

But perhaps the firmest convictions are a result of personal experiences. The young dominate the audiences of, for example, touring magicians and hypnotists. Those who have seen a travelling hypnotist and experienced him or her directly are hesistant to deny that something truly extraordinary has occurred. In like manner, watching magic or ESP demonstrations on television is equated with personal experience. Children "see" the phenomenon for themselves, forgetting the intervention of the medium of television.

The unfortunate result is that skeptical adults become involved in a battle for credibility with their own children. Although we can perhaps easily counter the influence of beliefs based on mere hearsay, there is real difficulty in getting children to question the validity of media-reported instances of paranormal phenomena. Why, after all, would newspapers, books, and television—the very tools adults use to illustrate and define reality for their children—suddenly be

misleading? In the case of personal experience, all these difficulties obviously become compounded.

The end result is that children are exposed to frustration and psychological dissonance. They must "choose" between the affirmations of a skeptical parent, respected adult, or teacher and the seductive authority of media and experience. However, we can quite easily provide them with the tools to make such decisions—and in a way that will simultaneously entertain and inform them. One obvious place to foster such lessons is the school. It is to the school's role that Elmer Kral recently addressed himself in the SKEPTICAL INQUIRER (Summer 1979), and we heartily endorse the recent founding of the CSICOP Education Subcommittee. At higher levels of education, the Spring issue of this journal comprehensively reported on a method for lessening belief in ESP among university students ("Believing in ESP; Effects of Dehoaxing," by Scot Morris). Equally obvious, and as important, is the fact that individual parents have an obligation to foster critical attitudes in their children. Parents are free to, and fully capable of, exposing their children to skeptical, scientific thought with this simple method. One can even envisage the media using this technique as a format for documentary or panel-type programs, and formal debates are a tailormade forum for implementing this method. And, of course, as a self-improvement program, the application is also straightforward.

However, since we, the authors, are educators and since the schools offer the greatest forum for a widespread application of the benefits of critical thought for children, we will place our ideas into the context of a classroom situation. We believe that the current popularity of the paranormal and pseudosciences can serve as the basis upon which teachers can develop a stimulating curriculum that will help foster a rational-scientific attitude. As we have reported elsewhere *(B.C. Teacher,* May/June 1979;Nov./Dec. 1979), teachers have a unique opportunity to use popular, readily available literature to initiate a curriculum unit on rational thinking and critical evaluation of information. Such a curriculum will expose students to both sides of arguments relating to pseudoscientific theories and belief systems. As a result, students will become familiar with the forms of argument and evidence employed by promoters of the paranormal.

Numerous classroom approaches may be employed. One idea is to have projects in which students study and evaluate the paranor-

mal phenomenon of their choice. In this case, we strongly recommend that students be first exposed to works that support the pseudosciences, and later to those that debunk them. Alternatively, the teacher could assign pseudoscientific books to one group of students and critical rebuttals to another group. The inevitable result is a highly stimulating debate. And of course more traditonal approaches, such as allowing students individually to choose a paranormal phenomenon and then read specific supportive and critical material, may be utilized as circumstances warrant.

Whatever the strategy chosen, pedagogical technique is secondary to the educational objectives of this approach. In investigating the claims of the pseudosciences through both sympathetic and critical accounts, students must be made to realize that they are dealing with fundamental questions on the very nature of cognition: "How do we decide between conflicting sources of information?" "To what degree are there tendencies toward sensationalism (indeed, occasionally irresponsibility) in certain sectors of the media?" "What exactly constitutes acceptable evidence in constructing an agrument?" "Precisely what are the advantages of a scientific-rational perspective?" Progressive educators are aware of the need to ask such fundamental questions. For example, Kelly and Crilly (1979), in an excellent short article addressed to the teaching profession, emphasize that "a critical intelligence is needed at the present time more than any other. The next generation will be called upon to solve problems of economics, overpopulation, and international strife of which our generation has only a hint" (p. 12). These authors identify five imperatives for developing critical inquiry that all teachers and parents would do well to heed (p. 13):

1. Impressing upon students the fact that the written word is not self-validating.
2. Providing adequate course and curriculum materials on the aims and objectives of science, that is, criteria for distinguishing science from pseudoscience: Is the theory testable? Falsifiable? Have independent investigators replicated their experiments successfully?
3. Being aware of the source of the information. What is the nature of the authority promulgating the viewpoint? What do other scientists say about the claims?
4. Questioning how well the observations and/or theory advocated

fit in with the established structure of science. Extraordinary claims demand extraordinary evidence.

5. Familiarity with the persuasive techniques of rhetoric and logical fallacies frequently used by pseudoscientists.

Following are some of the fascinating topics students could cover from either a sympathetic or critical perspective; and then they could engage in a dialogue with peers and in a guided discussion with teachers or parents to achieve the aims listed above.

Ancient astronauts. Erich von Daniken's thesis that our ancestors were visited by superintelligent aliens who effected mankind's entry into civilization has been popularized through worldwide sales of 34 million copies of *Chariots of the Gods?* (1971). Television and newspapers have added to the diffusion of this view. Ronald Story's *The Space Gods Revealed* (1976) is a readily available critical examination of both the logic and evidence von Daniken marshals.

Astrology. The widespread popularity of astrology is evidenced by the almost limitless literature promoting the belief that the position of heavenly bodies at the time of one's birth determines personality and influences the course of one's life. Students would probably find Dave Rudhyar's *The Practice of Astrology* (1968) and J. Manolesco's *Scientific Astrology* among the most convincing and readable pseudoscientific agruments in favor of astrology. The first chapter of Owne S. Rachleff's *The Occult Conceit* (1971) offers the most readable, wittiest, and hardest-hitting refutation of astrological claims. It is ideal for home or classroom, and we guarantee Rachleff's work will stimulate debate. (The rest of the book, which deals with witchcraft, tarot cards etc., is also highly recommended). For advanced students, parents, and teachers, more scholarly, but very concise, analyses and reviews are available, for example, I. Kelly, "Astrology and Science: A Critical Examination" (1979).

The Bermuda Triangle. This treacherous patch of watery geography has been the subject of an absolute overkill by the media. Leading the barrage is Charles Berlitz's *The Bermuda Triangle* (1974) and his more recent *Without a Trace* (1977). The classic rebuttal to Berlitz's sensationalistic claims is Lawrence D. Kusche's *The Bermuda Triangle Mystery—Solved* (1975). Because of the structure of Kusche's book, we strongly suggest that students first analyze Berlitz's account of an individual "disappearance" and then compare it to Kusche's explanation. This is, in effect, a case study that helps teach

children to distinguish between shoddy and thorough investigation and to recognize the sensationalism of spectacular, unwarranted conclusions.

Biorhythms. The superficially scientific cloak of pseudoscience has perhaps reached perfection in the theory of biorhythms. Here is a real opportunity for young people to see just how blurred the line between science and pseudoscience can become. Thommen's *Is This Your Day?* (1973) should pretty well convince the uninitiated. To test biorhythms in the cold light of proper empirical research, the student is best referred to three articles in the SKEPTICAL INQUIRER: Terence M. Hines, "Biorhythm Theory: A Critical Review" (1979). William S. Bainbridge, "Biorhythm: Evaluating a Psuedoscience" (1978), and A. James Fix, "Biorhythms and Sports Performance" (1976). Biorhythm theory, because of its current great popularity, which we suspect has still not peaked, is a particularly stimulating topic for students.

T. Lobsang Rampa. The popularity of T. Lobsang Rampa's ideas is probably attributable to his alliance with Zen, meditation, and other fashionable manifestations of Eastern mysticism prevalent today. Since his first and best book, *The Third Eye* (1956), appeared, the occult/mystery shelves of bookstores have abounded with his works. A short and excellent section of Christopher Evan's *Cults of Unreason* (1974, pp. 244-255) will undermine converts' convictions. Evan's book is here recomended not only because Rampa's claims to possess powers as fantastic and varied as clairvoyance, telepathy, levitation, and astral travel need refutation but also because Evans does an excellent job of examining a variety of other cults and movements. Thus a lesson larger than the Rampa fraud is concisely presented to those most susceptible to the propaganda of North America's numerous cults.

Pyramid Power. Another exceptionally "scientific" pseudoscience is manifest in the pages of Max Toth and G. Nielson, *Pyramind Power* (1974), and Bill Shul and Ed Pettit, *The Secret Power of Pyramids* (1975). These writers claim that models made to the dimensions of the Great Pyramid of Egypt will harness "biocosmic energy" that is capable of retaining the sharpness of razor blades, keeping food from spoiling, enhancing plant growth, and even controlling pain, alleviating health problems, and increasing sexual satisfaction. Teachers may turn to Wayne Lilley's short article "The Pyramid

Pushers" (1976) for a light, convincing refutation.

UFOs. And what is more imperative than helping students critically examine the UFO phenomenon? Today, much of our populaton is convinced that UFOs—that is, alien incursions into our world—are a "proven" fact of scientific life. Convincing evidence is offered in Emenegger's *UFOs—Past, Present and Future* (1974), Hynek and Vallee's *The Edge of Reality: A Progress Report on Unidentified Flying Objects* (1975), and Hynek's *The Hynek UFO Report* (1971). To combat this often very persuasive "evidence," we recommend Edward Condon, *Final Report of the Scienfitic Study of Unidentified Flying Objects* (1966) and Philip Klass, *UFOs Expalined* (1974)

Use of the materials above, supplemented by conversation with teachers and parents, will go far toward the development of a critical attitude in students. Such a debunking of the pseudosciences has an intrinsic educational value, with important implications for the understanding of other subject areas and, coincidentally, for the understanding of wider reality. At the very least, we will have given our children some basic critical/analytic skills to help them to evaluate skeptically the almost endless barrage of the bizarre and the unlikely they will encounter in the course of their lives. It is not hyperbolic to suggest that this is nothing short of psychological survival skill in this information-saturated and media dominated era.

Of course not all examples of the paranormal and the pseudosciences have been discussed, nor all resources available listed. (For example, past articles in this journal have rarely been cited—but readers of the SKEPTICAL INQUIRER are well aware of the content of past issues.) But we have touched on at least some of the new nonsense most popular with our children, and all the resources mentioned have been chosen using the criteria of readability, accessibility, and potential for impact upon young minds. If teachers and parents actively begin to utilize these resources and methods, surely recruits for the ranks of gullible believers needed by the next generation of high priests of the pseudosciences will become more difficult to find.

(*The Skeptical Inquirer*—Vol. V No. 2—Winter 1980-81)

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Computers and Rational Thought: Is the Chip Taking Too Big a Byte?

Ray Spangenburg and Diane Moser

For many of us the computer is symbolic. It has become almost a metaphor for all that is logical and rational. As it infiltrates more and more corners of our society, we the initiated silently scoff at those who show fear, and we feel quietly satisfied that at last the logical and lucid have begun to replace the irrational and confused. Occam's razor hangs poised, ready to cut clean. The revenge of the rational is at hand. And we who have been jousting against the careless and superstitious raise our battered, quixotic helmets in weary and thankful welcome.

But, while the computer has provided vital research tools to the scientific community, turned 10-year-olds into veteran byte-crunchers, revolutionized office correspondence, streamlined even small-business accounting, and invaded more than a million American homes, the long-range social effects may not be entirely in the interests of disciplined, critical thinking.

The problem is not with the computer, but with certain changes in our thinking environment that it may bring about. Changes that may reinforce the kind of careless thinking that permits unquestioning acceptance of claims of the paranormal.

Speed vs. Quality

The computer is a masterful efficiency expert. With it we can achieve goals more quickly, easily, and efficiently than ever before. But, as Samuel Florman (1984), an eloquent and resourceful defender of technology, pointed out in a recent article in *Technology Review,* such speed and ease may be achieved at the cost of depth and comprehension. Florman describes how he received a book-review assignment from the *New York Times* on a Tuesday with a Thursday due date—that same week! With the aid of the one-step word-processing typesetter in the bowels of the *Times* building, a helpful key-

board operator, and a telephone, Florman dictated his review almost directly into type on Thursday, made corrections Friday morning, and read his review in the paper Friday afternoon. In another scenario, he might have had his own word-processor transmit his copy directly over telephone lines, with no intervening operator. Our own most recent book went to the compositor in the form of a 5¼" magnetic disk. And the day is not far off when no keyboard entry will be necessary on anyone's part – the computer will just listen, recognize voice patterns, and act on them.

We have already witnessed the phenomenon of the instant book – the quick fix on the tragic Jim Jones cult in Guyana, the Carl Lewis story that hit the stands just days after the close of the 1984 Olympics. But, with the speed and simplicity of computerized word-processing, the writer may in fact lose out on the necessary time for contemplation, re-examination of one's thoughts, and critical analysis of one's own ideas. And this is a loss not just to writers but also to all who read their work. What we have gained in speed, we may have lost in coherence, clarity, and reflective deliberation.

If indeed we are to listen to and contemplate the words of our writers and thinkers, if we are to see a benefit from their influence upon our society, then we must demand quality, not just quantity, from them.

And our preoccupation with speed can sacrifice quality and the benefit of analysis beyond the world of words. Speed is the antithesis of contemplation, and contemplation is the handmaiden of creative thinking in every field – the kind of thinking that explores alternatives and looks beyond the apparent and even obvious. The kind of thinking that questions the believable hoax and the mystical, pseudoscientific, or romantic explanation.

The matter then is one of mind-set. The critical mind should be the contemplative mind. The hallmark of the true skeptic is his or her ability to search through a labyrinth of possibilities and arrive at conclusions that are logical and fit not only the facts on hand but the facts hidden behind the hand as well.

The Limitations of Framework Thinking

As we become more dependent upon computers, we begin to get locked into computerized problem-solving techniques. Sales clerks wait docilely in turn for use of a calculator to figure a simple addition. Writers addicted to word-processing become allergic to

pencils and yellow pads and imagine they can only write positioned before the phosphor screen. Not only do we no longer stretch our minds to do "what the machine can do for us," but – because we have limited the environment in which we do our thinking – we may cut down our range or pass up creative ideas as well.

One of the greatest dangers of the computer is the implication, with its binary logic, its YES/NO, OFF/ON line of thinking, that there is only one right way to solve a problem, to answer a question, or to seek a solution. The computer's implied endorsement of strictly linear thinking may stifle our ability to take those creative "leaps" rambling side-paths, digressions, and alternative explorations that are the very essence of creative activity – and critical thinking. For critical thinking at its richest is creative thinking. In dealing with claims of the paranormal, the simple question "How else could this be done ?" or "What other possible explanations are there for this ?" can be the critic's most valuable tool. Once we have lost the ability to find "alternative" solutions to our problems, we become susceptible to anyone who imposes an "authoritatively endorsed" or "it is because it is" argument upon us.

On the cover of a 1984 issue of *Science News*, a Sidney Harris (1984) cartoon depicted a robot musing to itself: "Artificial intelligence, yes. But I'm not so sure about artificial insight and intuition" So far, at least, computers really don't think like humans. In fact, recent research (Lerner 1984) indicates that the human mind probably does not function in a strictly binary, linear mode at all but that it is constantly networking and providing a sort of Gestalt feedback – the probable source of that "Aha !" or "Eureka !" experience of intuitive discovery. Linear thinking works well for certain kinds of problems. But it may leave out looking behind the facade. As James Randi (1981) points out, scientists, who are trained in linear problem-solving, "far from being the hardest audience for the professional charlatan, are often the easiest. A scientist thinks logically and in a straight line; his profession requires him to be able to do so. That's the way science works." But we are at our best when we add another, nonlinear dimension to our thinking, look for other possibilities, test our assumptions, look behind the facade.

In their book *The Psychology of the Psychic*, David marks and Richard Kammann (1980) also emphasize the need to develop the skill of alternative thinking to free ourselves from false assumptions,

to develop the *"art of doubt* to get unstuck from some of our self-defeating practices." They continue: "All great scientific discoveries illustrate this point. Our direct perception tells us that the sun drifts overhead from east to west every day. At night time, the whole sky drifts overhead in the same direction. It took the brilliance of Copernicus to see that one gets the same effect by a rotating world, and one gets the seasons by placing the sun at the center of the 'universe,' with the earth revolving around it... We are overschooled in knowing the facts, having the answers, pretending to be 'right.'"

Where quality of thought is lost or abdicated, the vacuum is often filled with the careless and irresponsible. Worse still, it can be filled with the superstitious and mystical. When arguments become reduced in depth and scope, recourse to the quick and easy comes much too easily. "In the beginning there was God" makes a much easier argument even today than any attempt to understand the richly detailed, still mysterious, and complexly conceived hypotheses of modern physics and the Big Bang.

Technological Mysticism

Ironically, as Daisie Radner and Michael Radner (1982, 200 ff.) point out in *Science and Unreason*, the very presence and indeed omnipresence of science and high technology in our lives may lead us to an easier acceptance of the mystical and miraculous.

Confronting more and more "miracles" of modern science and technology, such as television, laser beams, quark theory, voyages to the moon and planets, and small personal computers, the average mind accepts much – both actual and theoretical – that it does not truly understand. No one denies the existence of a television set simply because he or she does not understand its technology. How easy then to accept an argument for the existence of ESP, telekinesis or the Loch Ness monster, simply by acknowledging that "there are many things in life that we do not understand yet."

The computer then may not be a shining knight riding to the rescue of all that is thoughtful and rational. Like most "solutions," it may bring with it a new and different set of problems, especially if we allow it to become a standard by which we measure our very human thinking or a sort of excuse to stop thinking altogether. The abdication of personal thought can be a cultural disaster, whether the abdication is done in favour of a monarch, a tyrant, a religious authority, or a computer. And in this age of ever-increasing comple-

xity and apparent contradiction, the temptation of mental abdication is too great – as demonstrated by the evergrowing preponderance of pseudoscience, mystical cults, and religious fanaticism.

To use any tool well, one must also use it with care. As a tool the computer may be one of the finest creations of the human mind, a willing slave and an obedient servant that frees us from the repetitive and the mundane. But it is an aid to help us think. Not to teach us *how* to think or to think for us.

So it is time to rethink this wonder machine's place in our thought processes—making sure that in capitalizing on its benefits we do not abdicate our own responsibilities. As skeptics of not only the irrational and the illogical but of all that is presented to us as unquestionable fact, the responsibility is ours.

(*The Skeptical Inquirer*—Vol. X, No. 2—Winter 1985-86)

THE CHANCE TO CONVEY SCIENCE'S PLEASURES

Some scientists seem unwilling to engage in public confrontations on borderline science issues because of the effort required and the possibility that they will be perceived to lose a public debate. But it is an excellent opportunity to show how science works at its murkier borders, and also a way to convey something of its power as well as its pleasure.

— Carl Sagan in 'Groca's Brain'

SCIENTISTS AND BORDERLINE SCIENCE

Very few scientists actually plunge into the murky waters of testing or challenging borderline or pseudoscientific beliefs. The chance of finding out something really interesting—except about human nature—seems small, and the amount of time required seems large. I believe that scientists should spend more time in discussing these issues, but the fact that a given contention lacks vigorous scientific opposition in no way implies that scientists think it is reasonable.

— Carl Sagan in 'Broca's Brain'

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The Extraordinary Mental Bending of Professor Taylor

Martin Gardner

No one can say that John G. Taylor, professor of mathematics at Kings College, University of London, is not a brilliant and colorful personality. He was born in 1931 at Hayes, Kent, the son of an organic chemist. After getting his doctorate at Cambridge University, he taught mathematics and physics at a number of colleges in England and the United States, including a stint as professor of physics at Rutgers University. His technical papers (more than a hundred) display a wide range of interests that include pure mathematics, particle physics, cosmology, and brain research.

There is another side to Professor Taylor that I can best characterize as that of a ham actor who thrives on crowd adulation and personal publicity. When in the United States, he studied acting at the Berghof Herbert Studio, in Manhattan, and for a while was "sex counselor" for *Forum* magazine. In England, his constant appearance on radio and television shows made him such a celebrity that in 1975, when the respected British magazine *New Scientist* conducted a poll of readers to determine the world's top twenty scientists, Taylor made the list. The magazine's cover ran his picture alongside Archimedes, Darwin, Einstein, Galileo, Newton, and Pasteur!

Taylor also enjoys writing popular books about science, of which his best known was the international best-seller *Black Holes* (1973). It is not a bad introduction to black-hole theory, but toward the end of the book Taylor indulges in lots of freaky conjectures. He thinks it quite possible, for example, that Earth was visited in the distant past by extraterrestrials, who may have come in spaceships driven by "black-hole power generators." Saturn, he tells us, is the most likely planet that "high-gravity aliens" could have used as a way-station in their explorations of our solar system.

In his last chapter, Taylor considers the possibility that we have souls that are strcutured forms of energy capable of moving from one body to another. The universe, he reminds us, has two possible destinies. It may expand forever to die the familiar thermodynamic "heat death," or it may go into a contracting phase and eventually be crushed out of existence by a black hole. In either case, no matter will be left "which could realistically be said to be worth having a soul". However, the universe may bounce back from the big crunch. "The only chance of immortality then is in an oscillating universe. Even in that, everlasting life will not be of the usual form but one in which there may be no relation at all between one cycle and the next due to the enormous re-scrambling of matter in the collapsed phase. It could well be that souls will have to cast lots as to which of the variety of bodies they will inhabit in subsequent lives. That is, of course, unless the hand of God intervenes, his wonders to perform."

There is one other possibility of immortality. If one fell into a black hole, says Taylor, he might emerge in a parallel universe. This, however, has a big shortcoming. If two "close friends" fell into different holes, they could find themselves in separate universes with no possibility of reunion. "So there is always the chance that the immortality gained by falling through a rotating black hole may be a very lonely one."

In view of such quirky speculation, it was not surprising that in 1973, when Taylor appeared on a BBC television show with Uri Geller, he was so stunned by Geller's magic that he became an instant convert to the reality of ESP and PK. Geller did his familiar trick of duplicating a drawing in a sealed envelope. "No methods known to science can explain his revelation of that drawing," wrote Taylor with his usual dogmatism. The professor's jaw dropped even lower when Geller broke a fork by stroking it. "This bending of metal is demonstrably reproducible." Taylor later declared, "happening almost wherever Geller wills. Furthermore, it can apparently be transmitted to other places – even hundreds of miles away."

"I felt," said Taylor in his most often quoted statement, "as if the whole framework with which I viewed the world had suddenly been destroyed. I seemed very naked and vulnerable, surrounded by a hostile and incomprehensible universe. It was many days before I was able to come to terms with this sensation."

Although Taylor was supremely ignorant of conjuring methods,

and made not the slightest effort to enlighten himself, he at once set to work testing young children who had developed a talent for metal bending after seeing Geller on television. Taylor's controls were unbelievably inadequate. Children, for example, would put paper clips in their pocket and later take one out twisted. Nevertheless Taylor was persuaded that hundreds of youngsters in England had the mind power to deform metal objects. Curiously, Taylor never actually *saw* anything bend. One minute a spoon would be straight, later it would be found twisted. Taylor named this the "shyness effect." Metal rods were put inside sealed plastic tubes and children were allowed to take them home. They came back with the tubes still sealed and the rods bent. One boy startled Taylor by materializing an English five-pound note inside a tube.

So certain was Taylor that his high I.Q., combined with his knowledge of physics, gave him the ability to detect any kind of fraud that he rushed into print a big book called *Superminds* (published here by Viking in 1975). It will surely go down in the literature of pseudoscience as one of the funniest, most gullible books ever to be written by a reputable scientist. It is even funnier than Professor Johann Zöllner's *Transendental Physics*, inspired by the psychic conjuring of the American medium Henry Slade. Taylor's book is crammed with photographs of grinning children holding up cutlery they have supposedly bent by PK, tables and persons floating in the air during old Spiritualist seances, glowing ectoplasmic ghosts, psychic surgeons operating in the Philippines, Rosemary Brown displaying a musical composition dictated to her by the spirit of Frederic Chopin, and numerous other wonders.

Not the least peculiar aspect of Taylor's volume was his argument that all paranormal feats, including religious miracles, are explainable by electromagnetism. "The Geller effect is a case in point. Will it ever turn out that the miracles of Jesus Christ also dissolve in scientific speculation. ... This book has presented the case that for one modern 'miracle,' the Geller effect, there *is* a rational, scientific explanation. This explanation is also claimed to allow us to understand other apparently miraculous phenomena—ghosts, Poltergeists, mediumship, and psychic healing. What, then, of other miracles? Can they too be explained by these newly discovered powers of the human body and mind, and the properties of matter broadly described in the book?"

After writing *Superminds,* of which let us hope he is now super-ashamed, Taylor slowly began to learn a few kindergarten principles of deception. When the Amazing Randi visited England in 1975, Taylor refused to see him; but Randi managed to call on him anyway, disguised as a photographer-reporter. You'll find a hilarious account of this in Chapter 10 of Randi's Ballantine paperback, *The Magic of Uri Geller.* Taylor proved to be easier to flimflam than a small child, and his "sealed" tubes turned out to be so crudely sealed that Randi had no trouble uncorking one and corking it again while Taylor wasn't looking. Randi even managed to bend an aluminum bar when Taylor's attention was distracted, scratch on it "Bent by Randi," and replace it among Taylor's psychic artifacts without Taylor noticing.

Another crushing blow to Taylor's naive faith in Geller was a test of the "shyness effect" by two scientists at Bath University. They allowed six metal-bending children to do their thing in a room with an observer who was told to relax vigilance after a short time. All sorts of bending at once took place. None was observed by the observer, but the action was secretly being videotaped through a one-way mirror. The film showed, as the disappointed researchers wrote it up for *Nature* (vol. 257, Sept. 4, 1975, p. 8): "A put the rod under her foot to bend it; *B, E* and *F* used two hands to bend the spoon... while *D* tried to hide his hands under a table to bend a spoon."

Slowly, as more evidence piled up that Geller was a charlatan and that the "Geller effect" never occurs under controlled conditions, Taylor began to have nagging doubts. After several years of silence, he suddenly announced his backsliding. Of course he didn't call it that. Instead, he and a colleague at Kings College wrote a technical article for *Nature,* "Can Electromagnetism Account for extrasensory Phenomena?" (vol. 276, Nov. 2, 1978, pp. 64-67; also *SKEPTICAL INQUIRER,* Spring 1979, p.3.)

In *Superminds,* after considering all possible ways to explain psi phenomena by known laws, Taylor concluded that only electromagnetism offered a viable possibility. The *Nature* paper reinforces this view. Electromagnetism, the authors decide, "is the only known force that could conceivably be involved." They then report on a series of carefully controlled tests of ESP and PK using talented subjects. No psi phenomena occurred. When controls were eased, the phenomena did take place but the experimenters could not detect a

whiff of electromagnetic radiation. Their conclusion is that all the phenomena they investigated, metal bending in particular, have normal explanations.

More was to come. In *Nature* (vol. 279, June 14, 1979) the same authors published a sequel to their first paper. In this sequel, titled "Is There Any Scientific Explanation of the Paranormal ?" they again stress the fact that "on theoretical ground the only scientific explanation [for psi forces] could be electromagnetism." Their conclusion is that neither electromagnetism "nor any other scientific theory," including quantum mechanics, can explain dowsing, clairvoyance, or telepathy. "In particular there is no reason to support the common claim that there still may be some scientific explanation which has as yet been undiscovered. The successful reductionist approach of science rules out such a possibility except by utilization of energies impossible to be available to the human body by a factor of billions. We can only conclude that the existence of any of the psychic phenomena we have considered is very doubtful."

Now it is pleasant for skeptics like me, who also regard psi phenomena as possible but "very doubtful," to welcome Taylor back to our ranks. But surely his reasons are as shaky as those that converted him to the paranormal six years ago. The history of science swarms with observed phenomena that were genuine but had to wait for centuries until a good theory explained them. A lodestone's magnetism was sheer magic until the modern theory of magnetism was formulated, and even today no physicist knows why the acceleration of electrical charges inside atoms causes magnetic effects. It is not even known why electricity comes in units of positive and negative charge, or whether magnetic monopoles exist as theory seems to demand.

Kepler correctly decided, on the basis of confirmable correlations, that the moon causes tides; but in the absence of a theory, even the great Galielo refused to believe it. One could add hundreds of other instances in which a phenomenon was authenticated long before a theory "explained" it. On this I find myself in full agreement with J.B. Rhine and other parapsychologists who regard the lack of physical theory as no obstacle whatever to the acceptance of psi.

Science cannot absolutely rule out the possibility of anything, but it can assign low degrees of probability to extraordinary claims. In my view, which is the view of most psychologists, the classic psi

experiments are more simply and plausibly explained in terms of unconscious experimentel bias, unconscious sensory cuing, fraud on the part of subjects eager to prove their psychic powers, and, on rare occasions (such as those recently disclosed about S. G. Soal), deliberate fraud on the part of respected investigators.

The central point is this. When science assigns a low degree of credibility to an extraordinary claim, it does so by evaluating the empirical evidence. Geller and the spoon-bending children are indeed frauds, but the reasons for thinking this have nothing to do with the fact that the supposed "Geller effect" is unsupported by an adequate physical theory. It is because the conjuring techniques for fraudulently bending metal are now well known, and because the metal invariably refuses to twist whenever the controls are commensurate with the wildness of the claim.

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RITUALS AND SCIENTIFIC ATTITUDE

Surely science and superstition coexist but are not complementary. Scientific knowledge is a rational process in which dogma, rigidity, revelation, ritual, mystic belief and miracles should not find a place. The greatest damage done by superstitions is that they deflect attention from the primary cause and lead to a defeatist attitude of helpless acceptance. They stand in the way of unearthing the root cause and undertaking adequate remedial steps. The worst of the superstitions is that they are easy to make and hard to destroy. Scientific approach is to find consistency between theory and practice, between apparent and real causes of phenomena, through free and creative thinking, experimentation and objective analysis. Science has a built-in method for correcting its own mistakes. It is both perceptive and deductive and thus has an element of creation and destruction. Science affects skills, attitudes and behavioural patterns to which tradition and superstition offer resistance. A strategy has to be evolved for weakening the forces impeding this change and strengthening those that favour it. Scientific attitude and rational outlook should become a way life resisting rigidity and resilient to change.

— Prof. Y. Nayudamma

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Astrology —Sense or Nonsense?

H. Narasimhaiah

All of us know that according to astrology planets wield influence on human affairs. This widespread belief has been firmly implanted in the minds of people all over the world for centuries. The primitive man's beliefs were moulded largely by the events of nature whch instilled awe and fear in his mind. Lightning and thunder frightened him considerably. The eclipses which created darkness at noon should have scared even the most courageous primitive man. Earthquakes must have shaken him rudely. Dreams, diseases and death were all mysterious to him.

Ancient astrology had its origin in astronomy. But astronomy is a science. It is developing and evolutionary in nature. Everything is tentative in science. It is not dogmatic. All the theories and laws are revised in the light of new discoveries and investigations. If a subject has to get the status of science, it has to satisfy the well known conditions of objectivity, repeatability, consistency, universality and so on. Naturally all the branches of science started with imperfection on account of limitation in knowledge and crude instruments available at that time. Sometimes wrong assumptions were also responsible for such imperfections. But the greatness and grandeur of science is its constant objective quest for truth irrespective of anything else.

Ancient astronomy was as defective as any other branch of science during its early period. The starry sky and the moon had always attracted the attention of man from the beginning. Persons with curiosity and a keen sense of observation have tried to probe further to know more about them. The eye was the only instrument to get information at that time. According to astrologers there are nine planets—Sun, Moon, *Rahu, Kethu,* Mercury, Venus, Mars, Jupiter and Saturn. But the Sun and the Moon are not planets. Sun is a

star and the Moon is a satellite. Besides, *'Rahu'* and *'Kethu'* are non-existent. They are the figments of their imagination. Thus, out of the nine planets which form the basis of astrology two are not planets and two do not exist at all. Besides, the astrologers have no clear concept of time and its measuremet which play a very important part in astrology. All this gave astrology a very weak, faulty and shaky foundation. Any superstructure that is built on such wrong assumptions can never be considered as science by any stretch of imagination.

Planets once formed part of the sun according to science. Hence they have more or less the same physical condition. How such planets which are huge lumps of matter situated millions of miles away can be intruders in the affairs of man, passes one's comprehension. Besides, it is ridiculous to attribute all kinds of human qualities to planets. It is believed that depending on its positions the planet can be benevolent, malevolent, friendly, furious, revengeful and so on. It is unfortunate that the crude and the false ideas which entered into the minds of our ignorant tribal ancestors continue to have powerful sway on the mind of the man living in this age of science and technology.

Methods of science are very powerful tools used in any investigation to know truth. Application of these methods will have devastating effects on everything that is unscientific. These methods can conveniently be used to find out the veracity or otherwise of astrology.

Rahu Kala, Gulika Kala and *Yamaganda Kala* have astrology as their basis. When *'Rahu'* and *'Ketu'* do not exist as planets *Rahukala* and *Gulika Kala* obviously have no meaning. For the time being we will assume their existence and proceed further. According to astrology during *'Rahu Kala'* nothing auspicious should be initiated : no travel, of course no marriage, no religious function and nothing of that sort. If this belief is true then all the planes, trains, buses and other automobiles which start during *Rahu Kala* should meet with accidents. Even a cursory analysis of the phenomena of accidents will reveal beyond a shadow of doubt that the starting time is totally irrelevant to the nature of travel. Accidents do not owe their origin to the departure timings. In fact at big international airports such as New York, Chicago, or London planes will be taking off and landing almost continuously. They cannot wait to avoid *Rahu Kala.* It is ridiculous to imagine that a train should wait for the green signal by an

astrologer for its departure. Similarly some days are considered to be auspicious and others inauspicious according to astrology. It is not difficult to prove that no day is inauspicious and every day is innocuous.

Horoscope also has astrology as its basis. The horoscope of a person is written depending on the positions of the planets at the time of his birth. All the landmarks in the life of a person are assumed to be safely deposited in that document. It is meaningless to believe that the position of a planet will have a say in educational attainment, profession, marriage, foreign travel, accidents, death and so on. Planets seem to play a more important role in matrimonial alliances than even the bride and the bridegroom. Some horoscopes enlarge their limits of jurisdiction and claim that they can reveal disastrous effects on the would be father-in-law or mother-in-law. To make the furious effects of such planets ineffective, many times marriage alliances are sought with partners having no father or mother. It is common knowledge that not all marriages performed even after scrupulously matching the horoscopes of the bride and the bridegroom have been successful. Under this category there have been many premature widows and widowers. Generally royal astrologers are considered to be very 'reliable.' But this classification is disproved and consequently all the astrologers fall into the only category of unreliable group when unexpected tragedies, break up of families, misunderstandings, unhappiness overtake the couples who were 'made for each other' according to these 'choice' royal astrologers. It is interesting and educative to note that more than 90% of the people in the world do not have horoscopes and their marriages are as happy or unhappy as those of others. Hence astrology, not having universal validity, cannot claim the status of science.

Yet another critical analysis of some natural calamities delivers a mortal blow to the already tottering and shaky astrology. To come to the conclusion that the horoscopes of all the unfortunate victims of a plane crash tell the same fate for all of them is absurd. It is equally preposterous to believe that all the horoscopes of a cyclone or earthquake victims will reveal the same date of death.

This amounts to attributing intelligence and discriminating quality to a cyclone or an earthquake. Accordingly, it means that when a cyclone or an earthquake hits a region, it will strike at only those people having the same date of death as predicted by their horoscopes. Rich people who live in safe and strong houses in the

cyclone hit areas or earthquake prone regions will have obviously more fortunate horoscopes than those of the poorer sections who live in huts in such areas.

It is common knowledge that generally no two astrologers agree with each other. It appears as though each has got his own astrology and yet astrology is claimed to be a science!

Not only there will be conflicting claims by different astrologers but the same astrologer will be making haphazard predictions which are far out of the mark of reality. When all kinds of possible predictions are made by different astrologers it is inevitable that some predictions coincide with the actual happening. This does not prove the validity of astrology. Even a clock which is not working will show correct time twice a day! A monkey's relentless pounding on the keys of a typewriter may result in the formation of a word or even a short couplet of Shakespeare! This does not mean that the monkey knows either the art of typing or has a knowledge of Shakespeare's verse.

I wish to cite a very important prediction made by astrologers which was proved to be totally false. Indian astrologers cried hoarse from the house tops and gave a severe warning to the public that on the occasion of the conjuncton of eight planets—*Astagraha Koota*—in 1962 there would be catastrophy and heavens would come down. This was well publicised nationally and to some extent internationally also. But that day was as uneventful as any other day. And astrology met its Waterloo on that day.

Sometimes astrologers attribute the false prediction to quacks in the field. But, even if there is one astrologer in the whole world who can predict correctly and consistently and who can logically explain why an occasional prediction might have gone wrong, then some amount of credibility can be given to astrology. It may be appropriate to cite that in the field of science if something goes wrong then a thorough investigation would be made to know the causes of the failure so that suitable remedial measures may be taken. All of us know that a detailed probe after every plane accident makes future travel safer.

All the above examples show that astrology can be verified and disproved in the light of the day to day events. Still it is a matter of regret that many educated people and even scientists have blind faith in astrology. Man continues to be swayed by fear and hence is bound by irrational and authoritarian beliefs. A scientist or a stud-

ent of science is quite rational in his approach to problems inside the laboratory. But it is shocking to find the same 'rational' man being hopelessly irrational in trying to solve the problems of life. It seems as though his thinking faculty has taken a holiday! Even though man has reached the moon more than once and returned triumphantly, still there are two theories for eclipses — one for teaching in the class and the other to practise at home! Even today the sun and moon have not yet escaped from the clutches of *Rahu* and *Ketu*. It is not uncommon for a professor to teach Darwin's theory of evolution in the class and to accept an entirely unscientific theory in the church. For such persons science is more a means of livelihood than a way of life. Astrology is a superstititon which like all other superstitions blunts the edge of dynamic thinking and damages self confidence. The pollution of the atmosphere due to astrology and other superstitions is much more dangerous than that due to familiar pollutants.

Astronomy being a science has made tremendous advances. But astrology continues to cling to the earlier primitive beliefs and wrong assumptions. Still the same old 'nine planets' *(Navagrahas)* of which four are not at all planets guide the course of astrology. But the planets Uranus, Neptune and Pluto for years, long after their discovery by astronomers, have been waiting at the doors of astrology for recognition. And most of the astrologers continue to be blissfully ignorant of their existence.

The above critical analysis made in the light of the evidence available conclusively establishes that astrology is totally unscientific. But being a student of science I am prepared to revise my views in the light of any new information. I still keep an open mind — since I know that mind is like a parachute which works only when it is open. But I wish to submit that an open mind does not mean a vacant or a blank mind.

(This is an extract of the article published in *The Illustrated Weekly of India:* March 12, 1978)

ON SUPERSTITION

Such is the way of all superstitions, whether in astrology, dreams, omens, divine judgments, or the like; wherein men, having a delight in such vanities, mark the events where they are fulfilled, but where they fail, though this happen much oftener, neglect and pass them by.

— Francis Bacon, Novum Organum I

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Zodiac and Personality
—An Empirical Study

Michel Gauquelin

According to astrology, the twelve signs of the zodiac exercise different influences on people at the time of birth. When crossing any of the signs, the sun, the moon, the planets, and the "ascendant" (the rising sign at the time of birth) play distinct roles. Each sign is related to a type of character or destiny. Is that true ? The aim of the present study is to answer the question with some empirical evidence.

Introduction

In 1978, we conducted statistical experiments testing the possible influence of the zodiac on professional success. Results were entirely negative (Gauquelin 1978). These studies were based upon a sample of 15,560 births of successful Europeans divided into ten professional activities. The names of the persons were compiled from directories or similar publications, and the birth data (date, time, place) were obtained from official records. All the data were published by our laboratory in six volumes (Gauquelin 1970).

As one can imagine, these observations were criticized by astrologers, who felt that they lacked substance and failed to get to the heart of the problem. Astrologers claimed that professional success is far too crude a criterion to reveal the astral subtlety of zodiacal influences, which are much more effective on personality than on success. They said they would not accept our negative verdict unless we could prove, case by case, collecting character traits from biographies if necessary, that zodiacal influences do not exist. We decided to test the affirmation on a large scale, using an objective methodology.

Methodology

The character-traits material. We proceeded like this. We used the same set of people as before. This time, we collected their biographies. In 1968, we devised a way of using biographies objectively. We based our method on the idea that there are permanent traits of

character such as defined by J. P. Chaplin in his *Dictionary of Psychology*: "a relatively persistent and consistent behaviour pattern manifested in a wide range of circumstances." For each trait we opened a file, carrying on one side the subject's name and on the other the position of the horoscopic factors of his birth. What we did for one subject, we repeated for other celebrities, using published accounts of their personality. This gives us files on 52,188 personality traits taken systematically from biographies of 2,000 subjects—sports champions, actors, men of science, and writers. Let us note that the use of biographies and personality descriptions in ordinary language is a classical approach employed or praised by the leading specialists in the field of the psychology of personality (Allport and Odbert 1936; Bromley 1977; Cattell 1965; Eysenck 1970). To ensure the objectivity of the study we achieved a certain unity in all the biographical material. We never eliminated a biography and we considered every trait mentioned in every biography. It took several years to conduct this study. Data were published by our laboratory in four *Psychological Monographs* (Gauquelin 1973, 1974, 1977). Each monograph gives a description of the method used, the full catalogue of the personality traits, and all the biographical references from which these were culled. Astrologers can easily verify the value of our material.

Zodiacal positions at the births of our subjects were computed, and a sophisticated computer program allowed us to analyze the data collected as objectively and minutely as possible. We thank Neil F. Michelsen, president of *Astro computing Services*. San Diego, California, and his research director, Thomas Shanks, for their invaluable hlep in this matter.

Having at our disposal a large catalogue of character traits, together with the horoscopic data, we were ready to test a possible correlation between zodiac and personality.

The astrological key words. From among the numerous astrological textbooks in our library, we selected eight. The criteria of selection of the books were; (a) the renown of the textbook and (b) a reasonable amount of psychologically oriented key words. Several well-known books could not be included in our study because they do not give clear, short key words in their description of the psychological influence of the signs. This explains why, for instance, Dane Rudhyar's *The Astrology of Personality* was not retained. Ancient

authors could not be analyzed because their old-fashioned terminology does not contain enough of the key words found in our traits catalogue, which was compiled from modern biographers. The eight books chosen were:

The Principles of Astrology, by Charles Carter (1925)
The Modern Textbook of Astrology, by Margaret Hone (1951)
Defense et Illustration de l'Astrologie, by Andre Barbault (1955)
Astrological Keywords, by Manly Palmer Hall (1958)
Teach Yourself Astrology, by Jeff Mayo (1964)
Dictionary of Astrology, by Dal Lee (1968)
Keywords, by Paul Grell (1970)
The Round Art, by A. T. Mann (1978)

Based on our experience, we did not think it necessary to add any more books, since astrological tradition is consistent and all "serious" authors give more or less similar descriptions of the alleged astral influences.

In each of these eight books, we looked for the chapter devoted to the description of the zodiacal influences of the 12 signs. Then we established a list of the key words describing these influences and checked to see if they were present in the traits catalogues of our *Psychological Monographs.* A majority of them were present and were used for testsing zodical effects.

Let us give an example. In Margaret Hone's *The Modern Textbook of Astrology,* Chapter 4 is called "The Zodiacal Signs." Pages 49 and 50 describe "The Predominantly Aries Person" using character traits or behaviorial expressions. Here is the first paragraph of what Margaret Hone says about the Aries person: "He is very much of a firebrand or battering-ram. He will forge his way through life with courage, daring, energy and initiative and enterprise. He is the true pioneer. His one-pointedness of aim makes him direct and unable to use subtlety. He is incisive and often satirical in speech, cutting in invective."

Among the character traits listed in this paragraph, we looked for those that are also present in the catalogue of traits describing the subjects of our experimental sample. Eleven of them were found: courageous, daring, energetic, initiative, enterprising, pioneer, direct, subtle (not), incisive, satirical, cutting. Each of these traits is associated, in our catalogue, with the names of notable subjects to whom their biographers had attributed the trait. Thus "courageous" des-

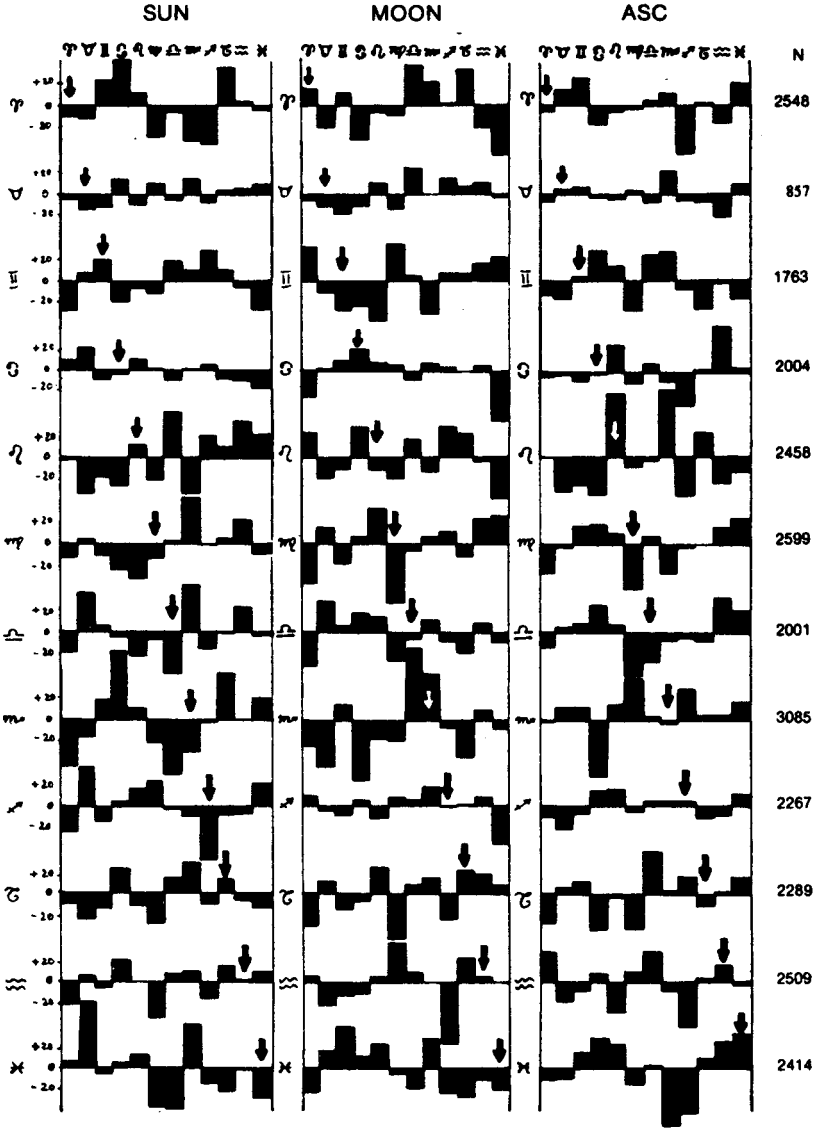

FIGURE 1. Zodiacal signs (keywords from Mayo) tested by the character traits analysis.

cribes the personality of sports champions, actors, scientists, or writers in our sample 378 times. At the birth of these subjects, we noted the positions of the horoscopic factors in the 12 signs of the zodiac. Since "courageous" is a key word describing the Aries personality, special attention was paid to the position of the celestial factors in Aries.

This procedure was applied to all the key words of Aries according to Margaret Hone; the same analysis was carried out for the other eleven signs, Taurus, Gemini, Cancer, etc., also described by M. Hone; and we followed the same process with the seven other astrologers under investigation.

Astrologers say that the traits of a sign are often found in the personality of the subject when this sign is "strong" in the subject's horoscope. Margaret Hone, for instance, speaks about "the predominant Aries personality." What does "predominant" mean? There is general agreement on this question among astrologers. A sign is "predominant" if one or several prominent horoscopic factors were in that sign at the moment of birth. The sign occupied by the sun, the moon, or the ascendant is said to be of paramount importance in imprinting its character on those "born under" it. Accordingly, we paid special attention to these three astrological factors in our statistical analysis of the results.

Results

Analysis by sign and by astrologers. The adjectives actually used by the eight astrologers to describe the characteristics of the signs were noted and the question was asked: In what sign do the people to whom these adjectives are applied by the biographers have the sun, the moon, and the ascendant? "If astrologers are right, one might expect that signs would show a good correlation and that those who had the sun, the moon, or the ascendant in a sign would in fact be described by the words applied to that sign. One would even expect that the correlation between the two would often be the best of the twelve possible correlations in each case" (Addey 1980).

An analysis of the data for each sign given in the eight textbooks is shown in Table 1. How many times are actual horoscopic frequencies greater than (+) or less than (–) expected for each sign at the birth of people who are described by the key words applied to that sign? Since we have 96 trials (12 signs for 8 astrologers), chance predicts 48 positive results and 48 negative results. For the

sun, 40 positive results were found against 56 negative ones; for the moon, 41 positive and 55 negative results; for the ascendant, 50 positive and 46 negative. The total turns out to be sharply against the influence of the signs, with 131 positive scores and 157 negative scores (average 144).

Table 1 also gives the results of the study for each sign and for each astrologer taken separately (data for sun, moon, and ascendant added). Here again the results are discouraging for the true believer. No sign scores significantly higher than expected by chance. The "bad" value of Libra has no more significance than the relatively "good" value of Aquarius. We can make the same comments looking at the results for each astrologer.

The total disarray of the interpretation of astrologers is more visible in the diagrammatic form of Figure 1, which shows the results in relation to the adjectives given by Mayo, taken as an example. It gives the sun, moon, ascendant 12-sign distributions at the birth of the subjects described by the words applied to Aries, Taurus, Gemini, etc. (the total "words count" for each sign being given on the extreme right of the figure). The values are published in terms of differences between the actual and expected frequencies. For each distribution, an arrow shows where the maximum of births should be to vindicate the reality of zodiacal influences. Obviously the results for Mayo are disastrous. In actual fact there are more cases where the appropriate correlation is the worst of the 12 signs (the sun in Libra and Sagittarius, and the moon and the ascendant in Virgo) than where it is the best (the moon in Cancer and the ascendant in Leo). Looking at the details, there are also striking psychological contradictions. For instance, the key words of the aggressive and passionate Aries and Scorpio correspond to a maximum of subjects born with the sun in Cancer, a sensitive and dreamy sign; and so forth.

We have not included diagrammatic figures for the other astrologers because their features are very similar to those of Mayo's and equally disastrous.

Most textbooks give very similar descriptions of the signs, and there is no reason to think that the eight textbooks chosen are in any way unrepresentative. The plain fact is that it is not Mayo, or Carter, or Barbault, or some other astrologer who is wrong. It is astrology itself.

The sidereal zodiac. In the United States and England, a school of

TABLE 1

Zodiacal Key Words According to Eight Astrologers

How many times actual frequencies are greater than (+) or less than (−) expected frequencies at the birth of people described by the words applied to that sign

Sign	Sun		Moon		Ascendant		Total for each sign		Total for each Astrologer		
	+	−	+	−	+	−	+	−		+	−
Aries	1	7	7	1	5	3	13	11	Carter	17	19
Taurus	1	7	2	6	5	3	8	16	Hone	16	20
Gemini	6	2	1	7	7	1	14	10	Barbault	13	23
Cancer	4	4	6	2	2	6	12	12	Hall	18	18
Leo	6	2	1	7	6	2	13	11	Mayo	14	22
Virgo	5	3	0	8	2	6	7	17	Lee	17	19
Libra	3	5	2	6	0	8	5	19	Grell	18	18
Scorpio	2	6	5	3	4	4	11	13	Mann	18	18
Sagittarius	3	5	2	6	2	6	7	17			
Capricorn	7	1	6	2	2	6	15	9			
Aquarius	2	6	7	1	7	1	16	8			
Pisces	0	8	2	6	8	0	10	14			
Total	40	56	41	55	50	46	131	157		131	157
Average	48		48		48		144			144	
Probability	n.s.		n.s.		n.s.		n.s.			n.s.	

n.s. means: not significant at the .05 level.

astrologers decided relatively recently to take account of astronomers' objections concerning the role of the precession of the equinox, which has shifted back the constellations by more than three-quarters of a sign since antiquity. Consequently, these astrologers say, the real zodiac is the "sidereal" zodiac, which follows the precession of the equinox, and the "tropical" zodiac used by traditional astrologers is a false one based only on appearances. Example: A subject born on the first of April is generally said to be born with the sun in Aries, but the "siderealists" claim he is actually born with the sun in Pisces because it is now the constellation Pisces that is beyond the travelling sun at the beginning of April and no longer the Aries constellation. If you remember that "Aries" subjects are said to be full of energy and decision and "Pisces" subjects are said to be dreamy and

dislike making decisions, you see how the two interpretations can be in striking contrast.

We do not intend to come into the tropical/sidereal controversy among astrologers. But we can bring some empirical arguments to the debate by carrying out the same analysis for the sidereal zodiac that we did for the traditional, tropical one. This new experiment was performed using the constant help of Astro Computing Services for the calculations. It can be summarized very briefly: The sidereal zodiac does not give better results than the tropical zodiac. No positive correlation was found between the key words given by astrologers and the character traits of the subjects born with the sun, the moon, or the ascendant in sidereal signs. The sidereal zodiac for Mayo's words, for instance, gives the same results as the tropical one, 14 plus and 22 minus (average 18). Scores for the other astrologers are no better.

How to Compute the Expected Frequencies in This Study

Example: expected frequency for the sun in Aries according to Mayo's key words.

Each trait for each person found in a biography constitutes a unit. The published "Psychological Monographs" contain a total of 52,188 such units. It is these data that constitute the raw material for our calculation.

Checking these 52,188 units we found the sun in Aries 4,151 times, the proportion being $4151/52188 = 0.07954$.

Of the total number of traits, 2,548 were selected as characteristic of an Aries personality according to Mayo's key words; thus, the theoretical frequency for the sun in Aries is $2{,}548 \times 0.07954 = 202.67$.

The actual number found is 194.

The difference between the actual and expected frequencies is -8.67.

The same procedure was followed for calculating the expected frequency of each horoscopic factor in each sign according to the astrologers' key words.

Discussion

The results of our study are clear-cut and need few comments. There is no correlation between character traits of the subjects and the signs under which they were born. In our previous studies, we had already found that there was no correlation between professional success and zodiac and no zodiacal-sign "heredity" between parent's and child's horoscopes (Gauquelin 1978, 1979). All this presents a large body of experimental evidence against the alleged influences of the twelve signs.

Our observations are consistent with several independent studies that tested possible sign effects; no significant correlation has been found. Among the abundant literature on the subject, some recent appraisals can be mentioned (Kelly 1979; Jackson and Fiebert 1980; Eysenck and Nias 1981) and several articles that have appeared in the SKEPTICAL INQUIRER [McGarvey. Spring/Summer 1977; Bastedo, Fall 1978 : Mechler et al., Winter 1980-81; Kelly, Summer 1981; Lackey, Fall 1981]. Even in serious astrological circles, a shadow of a doubt is emerging and the reality of sign effects is occasionally questioned. The most open-minded astrologers do not try to cover up proofs against sign influences (Addey 1980). Moreover, in a detailed survey of the astrological literature, two astrologers pointed out recently the dubious value of the so-called proofs claimed by astrologers themselves in favour of the signs (Dean and Mather 1976). In 1978, Dean even launched a prize of £500 to the benefit of the first author able to bring a scientific proof of the reality of zodiacal influences. Nobody was the winner of the prize. Of course, despite the pressure of the facts, almost all of the astrologers are still continuing to believe in signs. They are wondering how they could survive, as practitioners, a horoscope without a zodiac. For our part, we are wondering how the horoscope itself could survive such a fatal blow.

(*The Skeptical Inquirer*, Vol. VI No. 3, Spring 1982)

TOUGH HABITS OF THOUGHT

Find the occasional straw of truth a wash in a great ocean of confusion and bamboozle requires intelligence, vigilance, dedication and courage. But if we don't practice these tough habits of thought, we cannot hope to solve the truly serious problems that face us—and we risk becoming a nation of suckers, up for grabs by the next charlatan who comes along.

— Carl Sagan,
"The Fine Art of Baloney Detection." *Parade*, February 1, 1987.

26

The Moon and the Maternity Ward

George O. Abell and Bennett Greenspan

The role of the moon as the principal raiser of tides on the earth has been known for many hundreds of years and was first explained in terms of gravitational theory by Isaac Newton in the seventeenth century. Actually the gravitational force of the sun on the earth is more than 100 times stronger than that of the moon; but because the moon is nearer, the difference between its gravitational pull on the side of the earth nearest it and the pull on the other side farthest from it is greater than the corresponding difference in the sun's pull by a factor of about 2.5. Consequently, while the sun also plays a role in raising tides, the moon's role is dominant.

The importance of the moon in producing solar eclipse has been known for thousands of years; and similarly, eclipses of the moon, which occur on those in frequent occasions when the full moon enters the shadow of the earth, have been known since antiquity. Indeed the correct explanation of eclipses is found in the writings of Aristotle and must have been known much earlier.

Sunlight reflected to the earth from the moon, especially when the moon is near full, has been an important influence on man's affairs since antiquity. The harvest moon, for example, which occurs in autumn, when the angle that the moon's rising path makes with the horizon is such that there can be bright moonlight in the early evenings for several days in a row, has been a longtime boon to farmers. Obviously, the bright light of full moon is an aid to certain night time activities, just as the time near new moon, when the sky is darkest at night, is optimum for other activities, such as astronomical observations of faint objects. Song and poetry are full of allusions to the moon as an aid to romance. Perhaps there are psychological effects of the moon upon man as well.

The few obvious effects, such as tides and eclipses, and other spectacular phenomena associated with the moon give rise to a vast amount of lunar folklore and superstition. It has been claimed, for example, that crops fare best when planted just after full moon. The full moon has been associated with fertility, with women's menstrual cycles, with violence, especially murder and suicide, with incidences of epilepsy, with evil spirits, with madness, and even with lycanthropy (the curse of the werewolf). For a sensational, if rather inaccurate, account, see *Moon Madness* (Abel, 1976).

Many of the alleged influences of the moon are often cited as evidence that celestial bodies (the moon, at least) can affect humans and their affairs, and thus as support for astrology.

Full Moon and the Time of Birth

One of the most widely held beliefs about lunar effects is that there are many more human births at the time of full moon than at other times of the lunar cycle. The belief is even widespread among nurses in maternity wards and among some gynecologists as well. One of our colleagues recalls that his first child was born during full moon and that when he arrived at the hospital there were expectant women waiting in the halls for available rooms; the nurses all explained that "it always happens this way" at the time of full moon. Astrologer Sydney Omarr frequently refers to the incidence of crime and violence, as well as the higher birthrate, at the time of full moon and recommends that the moon be saved for romance.

There are some published studies that seem to support the idea that the full moon favors a higher than average rate of births. E. J. Andrews (1960), for example, reports that in the Tallahassee Memorial Hospital during the period 1956 to 1958 there were 401 babies born within two days of full moon, 375 within two days of new moon, and 320 within two days of first quarter. In a study of more than 510,000 births in New York City during the ten-year period beginning in 1948, Menaker and Menaker (1959) claim that the birth rate was about one percent higher during the two weeks following full moon than before. However, one of those authors (Menaker, 1967) later studied another half-million births in New York during 37 lunar months from 1961 to 1963 and reported a one percent excess in the birthrate during the two-week period *centered* on full moon. Subsequently, Osley, Summerville, and Borst (1973) reported on a study of yet another half-million births in New York, during a

later unspecified three-year period, showing a one percent excess in the birthrate during the two weeks *preceding* full moon. In contrast, Rippmann (1957) analyzed 9,551 natural births over a ten-year period in Danville, Pennsylvania, and found no correlation at all with the phase of the moon.

Again astrologers invoke the alleged influence of the full moon on the birthrate as evidence that celestial bodies can affect human affairs. It is not clear, however, how such a correlation would have anything to do with the interpretation of natal horoscopes according to the rules of Ptolemy (handed down from the second century) by which astrologers interpret the personalities and predict the futures for those individuals.

Still, if true, any correlation between the birthrate and the phase of the moon would be a very surprising result. Moreover, if properly interpreted, such a correlation would tell us something of the greatest importance to our understanding of the human reproductive cycle, to say nothing of influences over a distance of a quarter of a million miles that evidently have nothing to do with any of the known forces of nature. Thus we felt that the matter was worth a very careful check. Our analysis has been reported in the *New England Journal of Medicine* (Abell and Greenspan 1979).

Data

We have tallied all births, live and dead, from the records of the UCLA Hospital maternity ward during the period March 17, 1974, to April 30, 1978. In some instances a birth would occur at home before the mother left for the hospital or en route to the hospital. To be consistent, we counted only births that actually took place in the hospital. During the interval there were 11,691 live births at the hospital. Of these, 3,549 were induced (by drugs or Caesarean section), leaving a total of 8,142 births that occurred naturally. To take account of the possibility that inducing a birth might have caused it to occur on a date earlier than normal, we treated total live and natural births separately. During the same interval there were 141 instances of multiple births, all of which were twins except for four sets of triplets and one set of quadruplets. In some of these multiple births, one of the infants was born before the mother reached the hospital. Finally, there were 168 stillbirths amounting to 1.4 percent of the total.

The Lunar Phase

The average time that the moon requires to pass through a com-

plete cycle of phases—that is, from new moon to new moon, or full moon to full moon, an interval known as the *synodic month*—is 29.530588 days. Because our birth data are recorded by calendar days (midnight to midnight) we had to divide our period of 1,506 days into synodic months of either 29 or 30 days. Our procedure was as follows.

TABLE 1
Live Births at UCLA Hospital, March 17, 1974 to April 30, 1978

Phase Day	Total Live Births	Natural Live Births
1	406	273
2	390	273
3	425	291
4	412	287
5	391	270
6	396	282
7	399	293
8	398	276
9	383	260
10	380	271
11	364	243
12	398	292
13	372	261
14	411	279
15 (Full)	385	268
16	397	270
17	397	276
18	401	290
19	394	278
20	416	303
21	371	241
22	383	252
23	397	268
24	411	294
25	385	265
26	423	305
27	418	280
28	405	285
29	372	264
30	211	152
Totals	11,691	8,142

The local date of each full moon during the interval was obtained from the U.S. Naval Observatory's annual publication *The American Ephemeris and Nautical Almanac.* In each case we took the

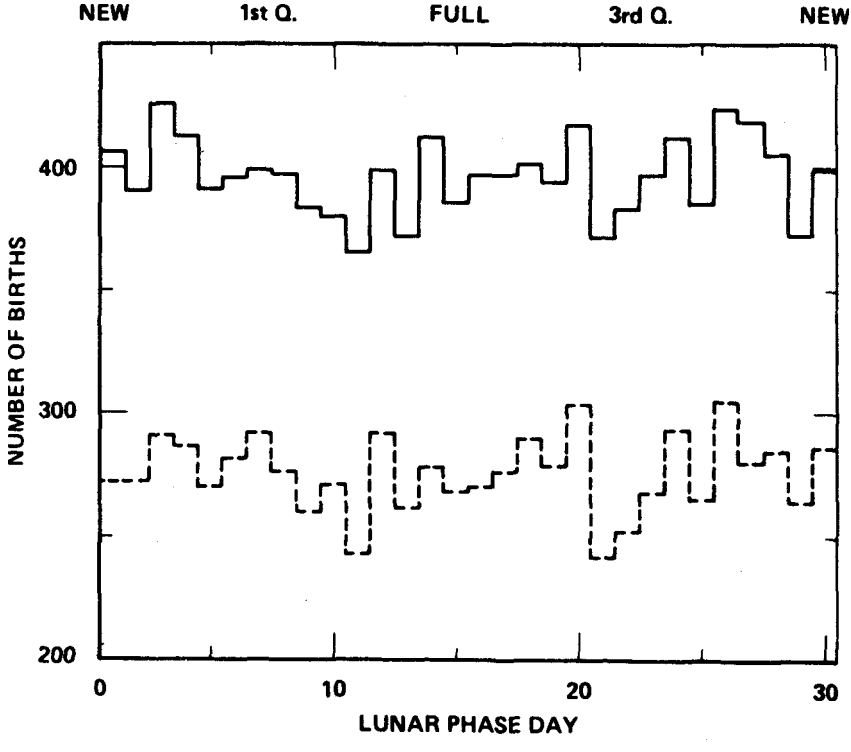

FIGURE 1. The numbers of total live births (solid line) during a four-year period at the UCLA Hospital plotted against lunar phase, and the numbers of natural live births (dashed line) during the same period.

local date in Los Angeles (between midnight and midnight, either Pacific Standard Time or Pacific Daylight Time, as appropriate). We defined the date of full moon as the fifteenth day in the lunar cycle. The previous day would then be lunar day number 14, and the day before that lunar day number 13, and so on. Thus by counting back 14 days from the date of full moon, we obtain day 1, which we define as the beginning of the lunar cycle; it is approximately the date of new moon. By counting forward from full moon, we define day 16, 17 and so on, until we reach the beginning of the next lunar cycle. In this way we determine whether the particular cycle has 29 or 30 calendar days. In the 51 synodic months over the period we surveyed, there were twenty seven 30-day months and twenty four 29-day months. Thus the mean length of the synodic month covered in our sample was 29.529412 days—very close to the known mean length of the synodic month.

Results

We next totalled all of the births that occurred on a first day of lunar cycle, on a second day of a lunar cycle, and so on. These figures for the total number of live births, and also the noninduced, or natural, live births, are displayed in columns 2 and 3 of Table 1, and are displayed in Fig. 1. The much smaller totals corresponding to the thirtieth day in the lunar cycle are not due to an avoidance of the day before new moon but to the fact that there were only twenty seven 30-day months among the 51 synodic months surveyed. (In Figure 1, the totals for day 30 have been increased by the factor 51/27 so that they could be compared with the data for other dates.)

There are no obvious peaks in the numbers of births either at full moon or at any other time in the lunar cycle. There are, of course, small fluctuations in the actual total numbers of births among the successive days of the lunar cycle, but such random fluctuations are expected.

We can, in fact, use a standard statistical test to check the hypothesis that day-to-day fluctuations as large as those observed would be obtained in a random sampling from a hypothetical population in which births occur uniformly throughout the lunar cycle. If, in fact, the phase of the moon has no effect whatsoever on numbers of births, we would expect a total number of live births on each day during the period covered that is close to the average number of 395.91, except for day 30 when the expected number would be only

209.60 (which is 27/51 of 395.91). The corresponding expected numbers of natural, or noninduced, births are 275.73 and 145.97, respectively. The standard χ^2 test shows that, for the total numbers of all live births, fluctuations from day to day in the lunar cycle at least as large as those obtained here would be found about 95 per cent of the time. Fluctuations in the day-to-day totals of natural births as large as those found here would occur 65 per cent of the time. In other words, fluctuations such as those we have obtained are entirely to be expected and there is no reason whatsoever to ascribe any influence to the moon on the numbers of births during the lunar cycle.

Multiple Births

The numbers of multiple births occurring during the period March 17, 1974, to April 30, 1978, are given in column 2 of Table 2. The numbers in Table 2 refer to the number of instances of multiple births (that is, sets of twins), whether or not one of the twins may have been born before the mother reached the hospital; the numbers do not refer to individual births. We have grouped the numbers of multiple births in 5-day intervals in the lunar cycle to obtain numbers of births large enough to make meaningful comparisons. Note that the interval containing full moon (day 15) contains the lowest number of incidences of multiple births of any of the intervals. However, this minimum is not significantly different from fluctuations expected by chance.

TABLE 2
Multiple Births and Stillbirths at UCLA Hospital, May 17, 1974, to April 30, 1978

Phase Day Range	Number of Multiple Births	Number of Stillbirths
3-7	27	26
8-12	27	33
13-17	15	23
18-22	24	26
23-27	31	30
28-2	17	28
Totals	141	166

If the incidence of multiple births is completely unaffected by the phase of the moon, we would expect the 141 sets of multiple births to be distributed evenly among the intervals with a mean

number per interval of 23.87, except for the interval containing day 30, for which the expected number of multiple births is 21.63. Again we used the χ^2 test to compare the actual incidence of multiple births with the expected ones and found that fluctuations as large as those observed here would occur 20 percent of the time. In other words in one-fifth of all such experiments as this we would find fluctuations from the expected numbers at least as large as those we have obtained. There is, therefore, no reason to ascribe to the moon any effect on multiple births.

Stillbirths

The distribution of 168 stillbirths among the same six 5-day intervals in the lunar cycle is exhibited in column 3 of Table 2. Again, the number of stillbirths obtained during the interval containing full moon is actually the lowest in the list. But again, there is no significance to these small fluctuations. The expected number of stillbirths, if the moon has no effect, is 28.108 for all of the intervals except the one containing day 30, when the expected number should be 25.462. A χ^2 test shows that fluctuations of the size obtained here would occur 78 percent of the time.

Conclusions

Our analysis of the nearly 12,000 live and dead births occurring at the UCLA Hospital maternity ward in an interval of 51 lunar months from 1974 to 1978 reveals no correlation between the numbers of births and full moon or any other phase of the moon. This negative result occurs whether we consider all live births, just those that are completely uninduced (that is, natural), incidence of twinning or other multiplicity or even stillbirths.

These results were a considerable surprise to several of the nurses at the UCLA Hospital maternity ward; for they, like so many others, fully expected to find a strong correlation of birthrate with full moon. To be sure, if one combs through all of the data, an occasional lunar month can be found in which there is a greater than average number of births at or near full moon, but these are only random fluctuations; there are just as many months in which there are fewer than the expected number of births near full moon. Probably the nurses simply remember those months in which they noticed there was a full moon during a particularly busy night. Perhaps it is similar to the tendency to remember those dreams that seem to come true and forget the vast majority that do not.

Our results appear to be at odds with some of the published surveys referred to above. At least among those mothers in the Los Angeles area who are cared for at the UCLA Hospital there appears to be no infleunce of the moon whatsoever on the times of their deliveries. We strongly suspect that the moon has no influence on birthrates anywhere in our society and are perplexed at the seemingly discordant results, especially those obtained in the New York samples. Because three of those studies purport to cover approximately a half-million births each, a very substantial amount of effort would have been required to carry out the tests properly. Especially in view of their discordant results, perhaps a new look at those data would be appropriate.

We know of other cases where claims of effects of the full moon have not been verified by careful statistical studies. Among these are Pokorny's (1964) study of 2,497 suicides and 2,017 homicides in Texas between 1959 and 1961; Pokorny and Jachimczyk's (1974) analysis of 2,494 homicides in Texas between 1957 and 1970; Lester, Brockopp and Priebe's (1969) analysis of 339 suicides in Erie County, New York; and Pokorny's (1968) analysis of 4,937 mental hospital admissions—none of which shows any correlation either with the phases or the distance of the moon.

The moon has unquestioned influence on the tides and on certain other phenomena, but several pieces of evidence at hand suggest that many of the "incredible facts" about the influence of the moon on man are simply not facts at all.

(*The Skeptical Inquirer*—Vol. VIII No. 4, Summer 1979)

SWAMI VIVEKANANDA ON ASTROLOGY

Let stars come, what harm is there? If a star disturbs my life, it would not be worth a cent. You will find that astrology and all these mystical things are generally signs of a weak mind; therefore as soon as they are becoming prominent in our minds, we should see a physician, take good food and rest.

27

Scientific Tests of Astrology Do Not Support Its Claims

Paul Kurtz and Andrew Fraknoi

An estimated 1,200 newspapers in North America carry astrology columns. While many editors chuckle and tell you that no one takes these columns seriously, the evidence does not bear this out. For example, a June 1984 Gallup poll showed that 55% of American teen-agers (ages 13-18) believe that astrology works. Continuous exposure to the ideas of astrology in newspapers contributes to that credulity.

Astrologers assert that astrology has a successful record stretching back 4,000 years and that this record speaks for itself. Yet dozens of scientific tests of astrological columns, charts, and horoscopes clearly contradict this claim.

The present formulation of astrology was largely codified by Ptolemy in the second century A.D. The basic premise is that the position of the heavenly bodies at the time and place of an individual's birth influences or is correlated with his or her personality, physical characteristics, health, profession, and future destiny. Classical astrology regarded the earth as the center of the universe, with the planets, stars, sun, and moon orbiting around it. The heavenly bodies were originally considered divine and possessing "magical" characteristics. Thus Mars, thought to be the color red, represented the god of war and signified courage and aggression. Venus was soft and white and was the goddess of love and beauty.

What does science have to say about astrology? First, modern astronomy has negated its key principle: that the earth is the center of our solar system. We know that the planets circle the sun, that our solar system is on the outskirts of a galaxy, which itself is only a part of an expanding universe that contains millions of galaxies. Moreover, new planets (Uranus, Neptune, Pluto) have been disco-

vered that were unknown to ancient astrologers. It is interesting that the presumed astrological influences of the planets did not lead astrologers to discover them long before astronomers did.

Second, we now know that a person's personality and physical characteristics are determined by his or her genetic endowment inherited from both parents and by later environmental influences. Several decades of planetary exploration have confirmed that there is no appreciable physical influence on the earth from planetary bodies. Indeed, the obstetrician hovering over the infant during delivery exerts a much greater gravitational pull than the nearest planet.

Third, there have been exhaustive tests of astrological claims to see if they have any validity. Astrologers predict that individuals born under certain signs are more likely to be personality types that become politicians or scientists. Thus you would expect the birth dates of these two groups to cluster in those signs. John McGervey, a physicist at Case Western Reserve University, looked up the birth dates of 16,634 scientists listed in *American Men of Science* and 6,475 politicians listed in *Who's Who in American Politics* and found the distributions of these signs were as random as for the public at large.

Are some signs relatively more compatible or incompatible with each other, as astrologers maintain? Professor Bernard Silverman, a psychologist at Michigan State, obtained the records of 2,978 couples who married and 478 couples who divorced in Michigan in 1967 and 1968. He found no correlation with astrologers' predictions. Those born under "compatible" signs married—and divorced—just as often as those born under "incompatible" signs.

In order to look for trends favouring astrological signs ruled by Mars (courage and aggression) as opposed to signs ruled by Venus (love and beauty), James Barth and James Bennett at George Washington University examined the horoscopes of men who re-enlisted in the Marine Corps between 1962 and 1970. No such correlation was found.

What about the often-heard claim of famous astrologers that they have made countless correct predictions over the years? Astronomers Roger culver and Philip Ianna examined 3,011 specific predictions by well-knwon astrologers and astrological organizations. The results indicated that only 10% of these predictions were realized. The public reads the predictions in newspapers and maga-

zines; the fact that 90% of these predictions never come true is not publicized.

Newspaper charts and horoscopes deal primarily with the sun signs rather than with other so-called planetary influences. Even astrologers admit that the sun-sign astrology featured in newspaper columns has little reliable basis for prediction of the day's events. Incidentally, very few astrology columns agree on what is supposed to occur.

Why then do so many people believe that astrology works? Careful inspection of astrological predictions in a typical newspaper column shows that the statements are so general and vague that they can apply to anyone.

The results of one experiment show why these statements sometimes seem to work. C. R. Snyder, a psychologist at the University of Kansas, and his colleagues drew up a personality description that incorporated the characteristics they found most people believed they possessed. They showed this descripion to three groups of people, each of whom was asked to rate on a scale of 1 to 5, how well they were described by it. The individuals in the first group were told it was a universal personality sketch, and the average rating was 3.2. Individuals in the second group were asked for the month in which they were born and were then told the statement was a horoscope for their signs. On the average, they rated it 3.76. The individuals in the third group were asked for the day on which he or she was born and were told that the description was his or her *personal* horoscope. This group rated the same description an average of 4.38. Apparently those who want to believe will do so!

We respectfully ask that newspapers let their readers know that astrology columns should be read only for their entertainment value and that they have no reliable basis in scientific fact.

(*The Skeptical Inquirer*—Vol. IX No. 3, Spring 1985)

THE GOSPEL OF BUDDHA

Star-gazing and astrology, forecasting lucky or unfortunate events by signs, prognosticating good or evil, all these are things forbidden.

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CSICOP's Call for a Disclaimer on Newspaper Astrology Columns

Kendrick Frazier

The following astrological forecasts should be read for entertainment value only. Such predications have no reliable basis in scientific fact.

The Committee for the Scientific Investigation of Claims of the Paranormal, publisher of the SKEPTICAL INQUIRER, has proposed that every newspaper astrology column carry the disclaimer above.

At a well-covered news conference at the California Academy of Sciences on November 9, preceding the start of CSICOP's 1984 conference, "Paranormal Beliefs: Scientific Facts and Fictions," Committee chairman Paul Kurtz issued a news release and statement asking all 1,200 newspapers in the United States that publish astrology columns to carry such a disclaimer.

Two weeks later, CSICOP mailed a letter to all U. S. newspapers, calling on them to publish the disclaimer. The letter was accompanied by a 4-page article written by Kurtz and astronomer Andrew Fraknoi, executive officer of the Astronomical Society of the Pacific. Entitled "Scientific Tests of Astrology Do Not Support Its Claims," it outlined the scientific perspective on astrology and summarized a few of the tests that have shown the claims of astrology lacking in any merit.

Both the news release and the letter said CSICOP, "an orgnization representing scientists, scholars, and skeptics worldwide, deplores the widespread uncritical acceptance of astrology by the public".

It referred to the recent Gallup poll (Sl. Winter 1984-85, p. 113) reporting that belief in astrology among young people is growing-40 percent in 1978 compared with 55 percent in 1984.

"America is the most advanced scientific and technological society in the world", said Kurtz. "If the U.S. is to maintain this

standing, it is essential that young people develop an understanding of the physical universe based upon reliable scientific evidence. It is unfortunate when people attempt to guide their lives by relying on outdated mythologies. A number of scientific tests have clearly shown that astrology has little or no empirical support for its claims. In particular, astrological columns, charts, and horoscopes carried in newspapers are pure fiction".

Added Fraknoi, who helped arrange the news conference: "Scientific literacy is essential for future generations, and the belief in pseudoscience tends to undermine the efforts of scientists and educators to improve the public understanding of science in this country".

Kurtz concluded: "In our view, newspapers have a responsibility to their readers to present an accurate picture of the world as scientists now understand it. Much the same as we label packets of cigarettes as dangerous to health, astrology columns should carry a proper label concerning their contents".

Most newspapers admittedly consider the horoscope columns an entertainment or reader-service feature. In answer to reporters' questions at the news conference, Fraknoi and others noted there was a darker side to it all. There are cases in which decisions affecting people's lives are made by others based on whether their astrological "sign" is correct. Some employers, for instance, use an applicant's astrological sign as a factor in hiring. Robert Steiner of the Bay Area Skeptics denounced such uses of astrology as a form of bigotry based on accidents of birth.

The disclaimer call was reported locally in the Bay Area news media and nationally by United Press International. Will it have any effect? Early reaction was mixed. Reporter Paul Engstrom of the *San Jose Mercury News* asked his own executive editor, Bob Ingle, whether he would comply. "My initial reaction is no," Ingle replied, "because everybody already knows that" (that astrology has no basis in scientific fact).

The editor of the *Knoxville News-Sentinel,* Harry Moskos, wrote a prominently displayed editorial-page column calling readers' attention to the scientists' statements, adding: "Kurtz is right in calling astrology pure fiction. His challenge not only raises the question of whether newspapers should be running a disclaimer but whether newspapers should be running them at all".

In a subsequent column (December 9), Moskos chronicled reader's reactions. Perhaps surprisingly, many readers agreed with the CSICOP position. Some even said it didn't go far enough "In the name of plain everyday common sense, why don't you cancel the daily Astrograph?" wrote one reader. Wrote another: "I think it is preposterous that a newspaper should waste one single inch of valuable space on astrology department". Said another: I think the column is a definite detriment to our society...."

The CSICOP mailing to newspaper editors on Nov. 2, 1985 prompted various reactions. Some published the letter as a letter to the editor. Some published the entire article. Others published editorials or their own articles in response to the mailing. Some responded by letter to Paul Kurtz.

"I agree with your point about astrology columns, and I wish we didn't have one," Jack Foster, editor of the *West Palm Beach Evening Times,* wrote Kurtz. "But killing an astrology column is an invitation to get your building burned down". He added that his newspaper doesn't publish its astrology column in the same space each time. "[We] make readers hunt through the paper to find it". As for the disclaimer, he decided they would not use it.

The entertainment editor of two Illinois papers was more positive. "I've been including your disclaimer with our astrology columns in the Charleston, Ill., *Times-Courier* and Mattoon, Ill., *Journal Gazette* since UPI broke the story a few weeks ago," wrote Dan Hagen. "I'll be running your article in our entertainment section as well. The efforts of the Committee to promote rationality are appreciated in this corner".

Donald J. Sterling, Jr., assistant to the publisher of *The Oregonian,* Oregon's largest daily, wrote a lengthy editorial column. It referred to the wording of the proposed disclaimer and commented: "The Oregonian's editors agree with that view of horoscope columns. So why does the paper publish them? Because some readers want them". He said the newspaper received 220 letters and phone calls of protest when it experimentally dropped Sidney Omarr's "Star Signs" column last September. Sterling reiterated that the newspaper publishes the horoscopes for entertainment value only "and not because the editors believe the columns have power to foretell human events." He devoted considerable space to the CSICOP statement and the critical studies of astrology referred to in the Kurtz/Fraknoi article.

Baxter Omohundro, managing editor of the Columbus, Ga., *Ledger and Enquirer,* replied that he and his colleagues had pondered the points in the letter "and have concluded that our use of such material on our comic pages is sufficient to signal any discerning reader that we regard them as entertainment material."

Not all the reaction was positive or genially neutral. Randall Howell of the *Mesabi Daily News,* Virginia. Minn., began his letter, "I'm darn tired of people like yourself telling other people what they should or should not do." He first thought the letter was a joke, then decided, "you are serious. How sad for science." He challenged science to "explain to me, scientifically if you will, the laboratory equivalent of love," and added, "I find it refreshing that people believe in something." He concluded that he was unimpressed and "only hope that you and your groupies soon stumble onto something worthwhile to warn people about." He signed himself "Editor.... and an Aquarian."

As we go to press, two more papers now carry the disclaimer: the *Indianapolis Star* and the *Wilmington (Del.) News Journal.*

(*The Skeptical Inquirer*—Vol. IX No. 3—Spring, 1985)

THE PERSISTENCE OF BAMBOOZLE

One of the saddest lessons of history is this: If we've been bamboozled long enough, we tend to reject any evidence of the bamboozle. We're no longer interested in finding out the truth. The bamboozle has captured us. It is simply too painful to acknowledge—even to ourselves—that we've been so credulous. (So the old bamboozles tend to persist as the new bamboozles rise).

— Carl Sagan,
"The Fine Art of Baloney Detection."

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Sense and Nonsense in Parapsychology

Piet Hein Hoebens

Parapsychology is indistinguishable from pseudo-science, and its ideas are essentially those of magic.

Parapsychology is a farce and a delusion, along with other claims of wonders and powers that assail us every day of our lives.

These somewhat unflattering remarks are taken from the concluding paragraphs of two recent books in which the pretensions of parapsychology are examined from a skeptical point of view. The first is from James Alcock's *Parapsychology: Science or Magic?* and the second from James Randi's *Flim-Flam!*

It was to be expected that such sentences would provoke the indignation of the parapsychologists—who in fact were quick to point out what they perceived as gross unfairness on the part of both authors. The complaint most frequently heard was something to the effect that both Alcock and Randi have overstated their case by generalizing their (often justified) criticisms of a subset of paranormal claims to the entire field of parapsychology—thereby tarring all proponents with the same brush. It is argued that, in their eagerness to exorcise the demons of the New Non-sense, the skeptics have failed to take into account the differences between "serious parapsychology" and the less than serious variety.

In his witty (and by no means unsympathetic) review of *Flim-Flam!* in *Theta,* Douglas M. Stokes writes: "In fact, almost all of the phenomena and claims Randi critiques in the book would be equally quickly dismissed by any competent parapsychologist as well. Only the lunatic fringe is going to be outraged by Randi's exposure of Conan Doyle's pictures of fairies, the underwater pyramid and road near Bimini, the space voyages of Ingo Swann and Harold Sherman, the Sirius 'mystery', ancient astronauts, 'transcendental levitation',

biorhythms, N-rays, psychic surgery, or the oversexed spiritis of Kübler-Ross."

This quote is interesting not only because it reveals what Stokes thinks of several of the best-known practitioners of Future Science but also because it implies the existence of a class of persons deserving the label "competent parapsychologists" and easily distinguishable from the crackpots who believe in the Cottingley Fairies, psychic surgeons, and the cosmic outings of Mr. Swann.

I suspect that both Stokes and the skeptics somewhat oversimplify matters: the skeptics by understimating the internal differences within parapsychology; Stokes, by projecting an all-too-neat competent incompetent dichotomy on the complex and confusing reality of modern psychical research.

It simply will not do to reproach the critics for discussing certain outlandish claims in the context of a critique of "parapsychology" or for attacking "weak" and "unrepresentative" cases, since the "parapsychological community" itself cannot agree on the criteria for "strength" and "representativity." We are faced with a similar problem if we want to decide who does or does not belong in the "community." Several proponents have suggested that membership in the Parapsychological Association (PA) and/or a record of publications in the PA-affiliated journals be regarded as a suitable criterion. However, membership in the PA and a record of publications in the serious journals does not guarantee the absence of the sort of beliefs Stokes thinks characterize the lunatic fringe. In parapsychology, the chaff and the wheat overlap to such an extent that neutral observer often finds it hard to tell the difference.

This of course does not justify overgeneralizations on the part of the critics. Precisely because parapsychology is an ill-defined field lacking a shared "paradigm," it would be unfair to hold each "parapsychologist" individually co-responsible for everything that is claimed by his or her nominal colleagues.

My purpose in this essay-review is to illustrate the previous points by comparing three recent books written by prominent European parapsychologists. One of these books is a clear refutation of the claim implicit in some critical publications that parapsychology is ipso facto antagonistic to skeptical inquiry. The two other books demonstrate with equal clarity that the sort of parapsychology skeptics rightly find objectionable is not confined to the *National Enquirer* and the ad pages of *Fate.*

Martin Johnson

Martin Johnson, the Swedish professor of parapsychology at Utrecht State University, is a somewhat controversial figure in the Netherlands—because local "believers" suspect him of being a closet skeptic. When, around 1973, the university authorities announced their intention to appoint Johnson "professor ordinarius," the Dutch Society for Psychical Research, dominated by the redoubtable Dr. Wilhelm Tenhaeff (who, much to his chagrin, had never been promoted from his second-rate status as a "special professor"), initiated an unprecedented and outrageous press campaign against that "Nordic woodchopper" who, because of his "gross incompetence," would "destroy the life's work of the nestor of Dutch parapsychology." (For more about Tenhaeff, see my two-part article on Gerald Croiset in *SI* Fall 1981 and Winter 1981-82.) Newspaper offices were flooded with angry letters. Questions were asked in Parliament. With a few notable exceptions, the Dutch media supported the "genius Tenhaeff" against the intruder from the Lapp tundra. The university was forced to accept a compromise. Johnson was appointed ordinarius but in addition Henri van Praag was appointed "special professor" to guard Tenhaeff's heritage.

Since then, the "special professor" has kept Dutch occultists happy with breathtakingly uncritical books, articles, and lectures on Sai Baba, flying saucers, Rosemary Brown, reincarnation, fairies and leprechauns, Uri Geller, Ted Serios, psychic surgery, and the imminent Age of Aquarius, while Johnson quietly established what has now become one of the most prestigious and respected parapsychology laboratories in the world.

Parapsychologie (orignally published in Swedish) is Martin Johnson's first book. It is intended as a general introduction to this controversial field. In refreshing contrast to most such introductions, it contains no pompous statements to the effect that the existence of psi has been demonstrated beyond any doubt and that only blind materialist prejudice keeps the scientific community from joining the parapsychological revolution.

To the contrary, Johnson agrees with the skeptics that the evidence for psi is weak and ambiguous and quite unable to support the grandiose cosmological claims others have tried to base on it. On the other hand, he believes some of the evidence is sufficiently suggestive to warrant further research based on the reality of psi as a work-

ing hypothesis. While Johnson personally is inclined to predict that future investigations will vindicate the psi hypothesis, he insists that the hoped-for breakthrough can only result from applying more rigorous research methods and from exercising more self-criticism.

Johnson agrees with his colleagues that there is considerable empirical support for the claim that something in the nature of ESP and PK (psychokinesis) exists, but he does not believe that this empirical support amounts to anything like proof positive. In a concise survey of the evidence presented hitherto he notes some promising developments (such as Helmut Schmidt's work with random-event generators and some research into psi and personality) but concludes that even with the most sophisticated experiments potentially fatal problems remain. In this context, he is remarkably candid about the role unconscious manipulation and deliberate fraud may play in his field. In this book, we are spared the ritual complaints about C.E.M. Hansel's supposed pig-headedness. Instead, Hansel's critique is welcomed as an interesting contribution to the debate.

There is an intelligent discusson of the replicability problem that has bedeviled parapsychology ever since its inception. Johnson points out that the concept of a "repeatable experiment" is more complex than is often assumed by critics. In mainstream science, opinions, wildly differ as to the level of replicability required for academic respectability, whereas history has shown examples of perfectly repeatable observations based on collective miconceptions. However, Johnson does not invoke these methodological subtleties in order to excuse parapsychology's shortcomings. He is quite firm in stating that replicability in parapsychology is insufficient, especially given the extraordinary nature of the claimed phenomena.

A fairly long chapter deals with the numerous attempts to make theoretical sense of psi. Johnson concludes that almost all such attempts precariously depend on "more or less fantastic auxiliary hypotheses" and usually raise more questions than they answer.

In a hilarious chapter on "Miracle Men" Johnson practices some hard-line debunking at the expense of the Uri Gellers and the Sai Babas—and of the parapsychologists who have uncritically endorsed these psychics. "Personally, I am amazed that an intelligent and honest man such as Erlendur Haraldsson [the Iceland parapsychologist who published some remarkably naive eyewit-

ness-accounts of the Indian saint's feats] seriously considers the possibility that Sai Baba, or the Babas of lesser caliber, could be anything but ordinary frauds," he writes.

The section of Uri Geller and other metal-benders is devastating—and should make some of Johnson's fellow parapsychologists blush with embarrassment. At the occasion of the 1976 Utrecht parapsychology conference, which he hosted, Johnson invited a Swedish amateur magician, Ulf Mörling, to demonstrate "psi" for the benefit of the assembled participants. From the outset, Mörling clearly stated that he did not claim any paranormal ability whatsoever and that all his feats were based on conjuring tricks. Alas, Johnson writes, after the performance was over several prominent parapsychologists became "skeptical" and started to speculate seriously about whether Mörling might be a genuine psychic without being aware of it. The PA member who most staunchly defended this theory was—the reader will have guessed—Ed Cox, former associate of the late Dr. Rhine and a self-proclaimed foolproof expert on magic.

Johnson is appalled by the credulity some of his collegues exhibited at the height of the Geller psychosis. He believes that this greatly contributed to the skeptical backlash of the second half of the seventies.

Johnson is not overly optimistic about his field's immediate outlook: "I think that parapsychology is presently in a critical stage. More unambiguous and robust findings will have to be presented if we want to justify its continued presence at the universities". And: "Time will tell whether psi research will bring about a conceptual revolution—or will languish in the backyards of the established sciences."

Having read *Parapsychologie* several times I am struck by the remarkable similarities between Martin Johnson's views and those of Ray Hyman, the skeptical psychologist who, among other things, is a member of the Executive Council of CSICOP. The book hardly contains a single statement to which a skeptic could reasonably object—unless he resorts to the a priori argument that the inherent absurdity of the concept of psi renders any serious attempt at investigation a waste of time.

Hans Bender

Professor dr. med. dr. phil. Hans Bender is a big name in international parapsychology. Arguably, he is the most renowned repre-

sentative of the field in continental Europe. His credentials are impressive. He is a (now retired) professor at the Albert-Ludwig University in Freiburg, a former president of the PA, founder of the serious *Zeitschrift für Parapsychologie und Grenzgebiete der Psychologie,* onetime host to international conferences, a contributor to John Beloff's state-of-the-art volume, *New Directions in Parapsychology,* and author of numerous papers published in reputable journals. By any definition, he belongs to the core of the international parapsychological community.

Bender too is a controversial figure at home. While thousands of Germans adore him as a prophet of the New Age of post-mechanistic spititutality the highbrow media in West Germany derisively refer to him as "der Spukprofessor." Bender has frequently and bitterly complained that he has been the victim of unfair criticism. He certainly has a point here: The average postwar German skeptic is hardly noted for polemical subtlety. Bender's enemies have mercilessly exploited an embarrassing incident that took place a few years ago. (The magazine *Der Spiegel* alleged that, for three decades, Bender had falsely sported a "dr. med." degree. The professor was unable to produce evidence to the contrary. Recently, he obtained a genuine medical degree on the strength of an extremely curious thesis on poltergeists.) All too often, they have indulged in ad hominem attacks and in misrepresentation of the claims they had set out to debunk. The anti-parapsychological writings of the Mannheim jurist Dr. Wolf Wimmer in particular contain a number of deplorable examples.

A closer examination of Bender's publications, however, may to a certain extent explain why parapsychology continues to arouse such hostile feelings among German rationalists.

Like Martin Johnson's *Parapsychologie,* Hans Bender's *Unser sechster Sinn* ("Our Sixth Sense"), a revised and enlarged edition of which became available in 1982, is a general introduction intended for a lay public. The authors of such books bear a special responsibility, since they must assume that, for the average reader, *this* book will be the most authoritative source of information on parapsychology he will ever be exposed to. General introductions, especially if written by university professors, decisively influence opinions and beliefs. That is why we may demand that the authors carefully refrain from overstating their case and give a fair presentation of the

pros and the cons. Johnson's book adequately meets this criterion, as did a small number of earlier publications, such as those by West and Beloff. *Unser sechster Sinn*, I am afraid, does *not* belong in this category. The purpose of this book is propagandistic rather than informative. The reader is urged to accept Bender's beliefs as scientifically established facts and is not alerted to possible rational objections to the author's views. The weaker points of parapsychology are carefully glossed over. Instead, we are regaled with the success story of a triumphant new science with revolutionary implications for our views of God, Man, and the Universe.

I believe that I am not the only reader to gain the impression that Bender basically is not interested in evidence, except when it can be used to illustrate a transcendent Truth that he personally would be happy to embrace without any evidence at all.

From Bender's discussion of so-called spontaneous phenomena, the casual reader will never guess why informed critics (including several prominent parapsychologists) resolutely refuse to accept such anecodotes at face value. Examples of seemingly perfect cases that were later conclusively exposed as due to error or fraud are conspicuously absent, although such examples are essential for understanding the controversial status of psi. The "normal" psychological factors that may lead to an "occult" interpretation of nonparanormal events are hardly mentioned at all. Alternative hypotheses to account for the data are either ignored, dismissed, or presented as applying only to an untypical subset of cases. I have reasons to take Bender's anecdotes with a grain of salt. The fact that he repeats the long-discredited claim that Jeane Dixon "predicted the assassination of John F. Kennedy" should suffice as a warning.

A similar bias is apparent in the sections on the mediumistic phenomena that were the main subject of pre-Rhine psychical research. Eusapia Palladino is discussed without any mention of the numerous occasions she was caught in fraud. The exceptionally important writings by the great German skeptics who flourished in the first decades of this century are ignored, except in one instance where Bender gives the wrong author for the chapter on the Schneider brothers in the classic "Drei-Manner-Buch" and dismisses the critics' arguments without even telling us what these arguments amounted to.

The classic laboratory experiments of the Rhine era are dealt

with in a similar spirit. Hansel's criticisms of the celebrated ESP tests with Hubert Pearce are summarily dismissed as having been conclusively refuted by Honorton and Stevenson. The naive reader gains the impression that there never was any *serious* dispute over the work at Duke University.

Inexcusably, Bender had chosen to leave the section on Soal's experiments with Basil Shackleton virtually unchanged in the 1982 "revised edition." These experiments are presented as having provided extraordinary strong evidence for ESP. Only in a later chapter—in a totally different context—does Bender casually remark that "tragically, doubts later arose as to the accuracy of some of Soal's protocols." Given the well-nigh incontrovertible evidence that this psychical researcher faked the most sensationally successful experiment in the history of parapsychology, Bender's discussion of Soal's work is—to put it mildly—utterly misleading.

The sections on the Rhine/Soal type of ESP and PK experiments performed in Freiburg present us with problems of a different nature. Bender claims fantastically significant results, but such claims are meaningless unless complete reports are available for skeptical scrutiny. The exact conditions prevailing during these experiments are anybody's guess. Inquiries in Germany revealed that no detailed reports were ever published. We have no means of knowing to what extent possible skeptical counter-hypotheses are consistent with the data. Could the significant results of the Achtert-Zutz experiments have been brought about by a coding system? Could the high-scoring subjects in the Pinno-Czechowsky experiment have filled in their scoring sheets *after* the random-event generator had produced the targets? Bender cannot blame the critic for being suspicious, especially since he himself compares some of these Freiburg experiments to the Soal-Shackleton series.

In the (new) section on Gellerism, Bender alludes to attempts on the part of certain anonymous magicians to expose the Israeli metal-bender as a trickster, but he typically fails to provide the sort of details that might persuade the intelligent reader to agree with the prosecution. His conclusion is that Geller may on occasion have resorted to trickery ("as do almost all mediums when they are unsuccessful") but that "in *The Geller Papers* the physicist Charles Panati has published experimental results that *prove* psychokinesis." (Emphasis added). No mention is made of the devastating criticisms

of *The Geller Papers* by, among others, Martin Gardner and Christopher Evans. We are not even allowed to know *which* "experimental results" Bender thinks have proved Geller's PK.

The metal-bending star-subject at the Freiburg institute—the Swiss Silvio M.—is introduced as a genuine psychic who has been able to perform his feats while observed by an acquaintance who is a member of Berne magic circle. Bender does *not* tell us that Silvio was unable to demonstrate any PK while observed by the prominent German magician Geisler-Werry and by Freiburg's own trick expert Lutz Muller or that he was caught cheating on several occasions. While I do not deny that there may be an as yet unexplained (as opposed to inexplicable) residue in the Silvio evidence, I object to Bender's suppressing facts that might cause his readers to doubt the authenticity of the Silvio phenomena. Similarly, I object to Bender's uncritical endorsement of Ted Serios's "thoughtography." *Unser sechster Sinn* is completely silent about the serious doubts that have been raised by skeptics and critical parapsychologists alike concerning the paranormality of these feats.

The sections on Bender's favorite clairvoyant—the late Gerald Croiset of Holland—are nothing short of disastrous. Bender credits Croiset with having paranormally located the remains of a missing Scottish woman in the early seventies, whereas in fact her body has never been found. He further enthusiastically relates the astonishing results of the 1953 "chair test" in Pirmasens, where Croiset is supposed to have given a highly accurate precognitive description of two persons who, at a specified moment in the future, would happen to be seated in specified chairs. Not only is Bender's "paranormal" interpretation of this case absurd; his account also abounds with factual errors. Bender cannot claim ignorance in this instance, as he himself had been the chief experimenter, and the "raw data" are kept at his own institute. Pirmasens is one of Bender's prize cases, and he has referred to it in numerous books, articles, and lectures. My own investigations into this alleged miracle have raised serious doubts about Bender's credibility as a reporter of unusual events. In his evaluation of the 1969 "transatlantic chair test" U.S. parapsychologist Jule Eisenbud made with Croiset, there is a curious discrepancy with the original 1972 edition. In 1972, Bender called this experiment "successful." In 1982 he calls it "controversial." What has caused Bender to change his mind? We are not allowed to know.

Needless to add that Bender refrains from informing his readers of the reasons many of his fellow parapsychologists now regard the late Wilhelm Tenhaeff, Croiset's chief chronicler, as a disgrace to the profession. Instead, Tenhaeff is hailed as one of the pioneers of psychical research.

The section on poltergeist phenomena naturally gives pride of place to the celebrated Rosenheim case of 1967-68, which was investigated by Bender and his team. Rosenheim is generally considered one of the most striking ghost stories of all time, and not without justification. From the available material it seems difficult to think of a nonparanormal scenario to account for the data without leaving an uncomfortable number of "loose ends."

However, the case is certainly not as strong as Bender suggests. No full report of the investigations has ever been published, so we are in no position to check to what extent the parapsychologists have been successful in excluding naturalistic explanations. A case in point is the heavy (about 175 kilograms) cabinet that is said to have been moved 30 centimeters away from the wall by a paranormal agency. It is implied that Annemarie S., the young office-girl who was seen as the focus of the disturbances, could never have achieved this by normal means. However, in Bender's accounts one searches in vain for the answers to such essential questions as: Did anyone witness the actual movement of the cabinet? Did the cabinet weigh 175 kilograms when empty or is the weight of the files that were kept there included? Did the cabinet have handgrips? What experimental evidence has convinced Bender that 19-year-old girls cannot move 175-kg cabinets? (Experiments with my own 230-kg piano suggest that they can).

Worse is that Bender omits from his account the highly significant fact that Annemarie was caught in fraud by a policeman. Neither does he mention the inconclusive but curious discoveries reported by the Viennese magician Allan after a visit to the Rosenheim office during the poltergeist outbreak. He states that it was possible to capture a "phenomenon" (a painting turning around "120 degrees" — that is 200 degrees less than was claimed in Bender's first report!) on Ampex film. He does *not* tell us why persons who know something of the background of that incident refuse to be impressed with the piece of evidence.

In none of his publications of which I am aware has Bender ever

referred to the suspicious features of the case. Presumably, his silence has misled Eysenck and Sargent, in their militantly pro-psi book *Explaining the Unexplained,* to claim that "despite the fact that many people—highly trained in different disciplines—were looking for evidence of fraud all the time, no hint of it was ever sniffed."

The publication of Bender's most recent book, *Zukunftvisionen, Kriegsprophezeiungen, Sterbeerlebnisse* ("Precognitive visions, war prophecies, death experiences"), has done little to restore my faith in the nestor of German parapsychology. A detailed examination of this incredible work would be beyond the scope of this article. I will restrict myself to exposing what to the uninitiated reader must appear to be a perfect proof of the reality of precognitive ESP. On the first page of the book, under the chapter heading "Visions of the Future from a Scientific Perspective," he tells the story of the Ameican student Lee Fried, who, Bender says, in 1977 dreamt about a recently deceased friend who showed him a newspaper bearing a future dateline. The headlines referred to a collision of two 747's over Tenerife with 583 people dead. Fried informed the president of his university of his premonition. Ten days later, the terrifying dream came true to the letter. According to Bender, "the opponents" will try to explain away such miracles by questioning the accuracy of the facts but in the case of the Tenerife prediction they stand no chance, for the documentation of the facts cannot be faulted. (In the chapter on parapsychology that Bender and his apprentice Herr Elmar Gruber contributed to *Kindlers Handbuch Psychologie,* it is stated that the Fried prophecy is "reliably documented"). All the stubborn skeptics could possibly do, Bender says, would be to resort to the preposterous hypothesis that the perfect match between premonition and actual disaster could have been brought about by chance.

Alas, the paranormal warning-system does not seem to have worked for Hans Bender when he wrote down those paragraphs. His version of the facts would indeed seem to preclude a naturalistic explanation. However, he managed to get all the crucial facts wrong. The Fried "prophecy" is a well-known, much-publicized, well-documented, and confessed hoax. In Bender's account, the facts have been distorted almost beyond recognition.

Fried of course never *told* the president of the university of the impending Tenerife disaster. What he did do was to put an envelope, said to contain an unspecified "prediction," in a locked drawer

in the president's office. When the catastrophe had taken place, the envelope was opened and a piece of paper with the words "583 Die in Collision of 747's in Worst Disaster in Aviation History" was produced. Soon after, Lee Fried frankly admitted that he had planned the prediction as a stunt. The slip of paper containing the "prophecy" was inserted only *after* the disaster, by sleight of hand.

According to *The Second Book of the Strange,* the Fried episode has shown that "the credulousness of at least a proportion of the news-consuming public is almost unlimited".

We cannot really blame the public for occassionally failing to distinguish between the fact and fraud. However, we are entitled to expect better from the most prestigious representative of scientific parapsychology in Germany.

Discussion and Conclusion

Hans Bender has stated that his conviction that the paranormal exists is "unshakable." Furthermore, he has repeatedly affirmed his belief that a wider acceptance of psi will be highly beneficial to mankind. Parapsychology is the supreme weapon against the "mechanistic world-view" of the intellectual establishment—a world-view that Bender holds responsible for many of modern society's most serious problems. From the vantage point of the moralist, such considerations would justify a certain nonchalance vis-à-vis the scientific facts. As soon as one's convictions become unshakable, evidence ceases to be relevant—except as a means to convert the unbelievers—and factual inaccuracies in the parapsychological propaganda are excusable in the light of the Higher Truth. I do not wish to impugn Bender's integrity. I am satisfied that his public statements and actions are consistent with his personal values. These values, however, are clearly incompatible with the spirit of scientific inquiry.

It is typical of the pre-paradigmatic status of parapsychology that Bender continues to be regarded as one of the foremost representatives of the field. Alcock has posed the question : Is parapsychology science or magic ? No unambituous answer can as yet be given. While Martin Johnson has shown that at least *some* parapsychologists are engaged in activities virtually indistinguishable from what critics mean by "skeptical inquiry," the case of Hans Bender demonstrates that the demaraction line separating scientific parapsychology and fringe occultism is by no means as sharply drawn as some proponents have optimistically claimed.

(*The Skeptical Inquirer*—Vol. VIII No. 2, Winter 1983-84)

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Quantum Theory and the Paranormal:

The Misuse of Science

Steven N. Shore

The Psychic World has discovered microphysics. After having been oppressed for many years by physical arguments against precognition and remote viewing, the paranormalists have suddenly discovered a way out—the quantum world. It is a place where, it seems, anything can and will happen; where consciousness plays a physical role; where the "whole" is indivisible into its constituent parts; where all things communicate intimately with one another and all being is shared. In short, it is the realm in which lurk the processes long sought to explain all psychic and paranormal phenomena (astrology included).

This is the view recently promoted by several popular accounts of the "new physics:" *The Tao of Physics* by Fritjof Capra, *The Dancing Wu Li Masters* by Gary Zukav, and *Physics as Metaphor* by Roger S. Jones. They seek, in the noncausal and non-deterministic mazes of quantum mechanics (QM), the source of all "metaphysical" phenomena. The popularity of these books has been so great that they have even begun to contribute to the jargon of the parapsychologists. Vibrations of the vacuum, action at a distance, indeterminacy, and faster-than-light communication have begun to turn up in the speculations of those who try to provide some physical justification for their laboratory-based results. In the circles of the paranormalists, J. H. M. Whiteman and Russell Targ and Harold Puthoff have made the most extensive "public" cases for these explanations. Rather than examine the experimental claims of these investigators, which have been dealt with by other writers in these pages and elsewhere, I will simply examine the claims made by those who use the foundation of QM to explain the paranormal.

The basic principles of QM can be stated simply: It is a language for describing the operations of a measuring device in a physical experiment at the microscopic level. In this context, it allows one to envision the structure of microworld phenomena. The picture that dominates the popular perception is that of a very small observer making measurements on a physically discrete system—that of a quantum jump. The justification for even thinking that the status of a microsystem is dominated by discontinuous processes is drawn from atomic physics, where we see electron transitions in an atom taking place in discrete units, absorption and emission lines, between stationary states that are the energy levels. The fact that only certain levels appear to be allowed within an atom is analogous to the stationary states produced in a musical instrument. Musical notes are the product of a wave that reaches a stationary state (also called a standing wave). Without this analogy of an oscillation that is self-interfering unless certain conditions are maintained, the usual conception of the quantum leading to energy levels without permissible intermediates would appear logically—and experimentally—incomprehensible. However, what we should keep in mind is that this is an empirical fact, not just an analogy.

This discreteness in the microscopic world can be viewed from two standpoints. One is that it is the product of our way of measuring the system, that we are requiring an all-or-nothing interpretation. The alternative is the existential approach, which, I think, is characteristic of most working scientists: If this is what is demanded by nature, then our job is to provide the most complete description possible within the bounds of this phenomenology. The aim of Q M. then, is to describe in an economical fashion the logical outcome of this picture of the microscopic world.

There is no question that the microscopic world presents many aspects that violate our macroscopically formed intuitions. The deterministic world we apparently encounter daily is not coherently and completely adduced from quantum first principles. The Heisenberg uncertainty relations, in the form in which quantum theory states them, cannot necessarily be interpreted within the context of classical experience. Go to any standard text on QM, for example, and you will see the uncertainty principle stated in several different ways. The most popular, and probably the one held by most working physicists, is the so-called Copenhagen interpretation: The

measurement process interfers with the system in such a way that the exact measurement of one process destroys the information available on any other system variable that is conjugate to it. This can be thought of as an artifact of the representation of the state, or of the details of the calculational procedure used in the determination of the expected outcome of any physical experiment. For example, in the famous gamma microscope experiment of Heisenberg (which he used to justify the uncertainty principle), the position of an electron under a microscope is measured by scattering a photon off the electron. The momentum of the particle is disturbed (interfered with) by the scattering process in an unpredictable way, leading to an uncertainty in the momentum at the same time as we see certainty in our measurement of the position. Why? Because the quantum of the device with which we measure the system is on the same scale as the particle we wish to measure.

How do the parapsychologists (PPs hereafter) attempt to use QM to explain their results? First, in QM a composite system is seen as the product of the functions describing the individual states. We can look at it this way. In human conception, there is a fifty-fifty chance that the fertilized egg will develop into a male and the same chance that it will develop into a female. In QM, we would be forced to represent this as a superposition of the two states. We know, however, that once the child is born, it is either one or the other. The philosophically minded physicist will say that before the moment of birth, while you are still in ignorance of the status of the fetus, the system is a purely superimposed state—male and female simultaneously. The measurement process—that is, the birth—instantly collapses the representation of the system to one or the other final state. Now of course the system is not in fact a superposition of the states. At the moment of fertilization the egg becomes genetically either male or female. However, since it has a finite probability of being either, the only description allowed by QM is that it is *both* until it can be directly measured. QM thus attempts to provide the entire spectrum of possible measurements a priori; the fact that the real world only allows for one or the other to exist simply means that, in interpreting the final system, we classically describe the world as consisting of a limited number of outcomes.

The PPs now step in, insisting that the system really consists of the pregnant woman, her wishes for a child of a given sex, the doc-

tors who will be involved in the delivery, the father who will have his own desires for the sex of the child, and the entirety of the world. All of these are *physically* acting on the fetus to determine the outcome of the birthprocess. In the world of the paranormal, then, the fact that QM demands a representation of any system as being intimately connected with outside influences—that QM represents every state as inherently mixed—means that even the influence of the positions of the stars must be taken into account in order properly to account for the nature of the fetus. Action at a distance by the stars and the psychic vibrations of the minds of the conscious participants should all be taken into account in the final determination of the sex of the child. As Targ and Puthoff state: "... the laws of physics do not absolutely forbid the transmission of information from the future to the present."

At first, this appears to make some sense. After all, if the system (fetus) is in reality a subsystem (part of the mother, who is part of a family, which is part of the human population, which is a product of nature at large), all of the parts should be interconnected and therefore capable of mutual influence.

There is only one problem with this. In QM, most of the interactions of a system with the outside world are destroyed by incoherent processes, so that only those strong enough to have a direct influence on the system can act on it. The representation of the state may be a superposition of the entire "wave function" of the whole universe, but the effect of any part of the universe on the system is governed by the strength of its interaction.

For example, suppose we calculate the influence of a person on a transistor in a laboratory. The transistor is an atomic device whose action results from the allowed states for the electrons due to the atomic structure of the crystal and voltage placed across it. If we look at the gravitational interaction of the observer with the device, we see that in comparision with the electromagnetic influences within the atomic structure of the transistor the strength of the couple is too weak to make any difference. If we look instead at the electromagnetic interaction between the observer and the device, we must calculate the rate of generation of electromagnetic waves from the observer and their rate of absorption by the transistor. This can be done quite simply within the physical machinery of QM. Again, we find that the effect is too weak to make any difference.

But, says the PP, we can postulate the existence of a field of unknown nature that represents the "interaction" of the observer with the transistor; we can then state that this interaction is responsible for any seemingly paranormal phenomenon. After all, the PP says, the observer is part of the wave function of the system, so anything he does will influence the state of the system. His mere presence will influence the outcome of the experiment.

Unfortunately, the PPs insist on including the quantum mechanical action of the wave function in their supposed explanations of paranormal phenomena. The most recent of these is the attempt by Zukav in *The Dancing Wu Li Masters* to elevate Bell's theorem to the level of an epistemological breakthrough of world-shattering consequence.

Bell, who was fascinated by the problem of QM measurement posed the following thought experiment. Let us imagine that we have two electrons created initially in a singlet state—that is, they initialy have spins anti-parallel to each other at the time of formation. You can envision this as trapeze flyers who link hands. Now allow these two electrons (trapeze artists) to separate in opposite directions in space. The singlet state is symmetric about the axes of motion (see Figure 1), and therefore we are initially in ignorance about the axis along which each one has its spin aligned. One thing

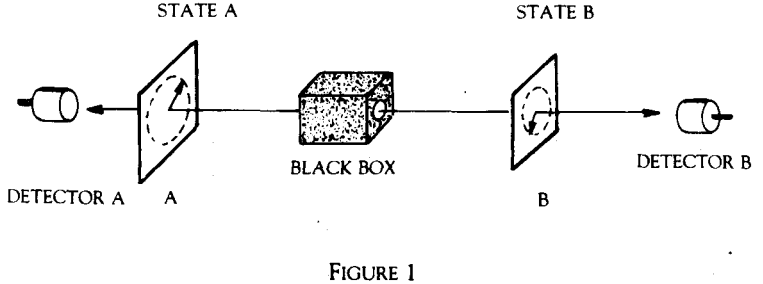

FIGURE 1

is certain, though. Since they were initially formed in the singlet state, any measurement made on one will immediately tell you the spin of the other—it must be opposite. The conundrum appears when we add the freedom of choice. The observer can allow the electrons to separate for a while and then choose *any* axis about

which to look for the spin component. If the particles have been in flight long enough, they will be causally disconnected from each other, so that a signal travelling at the speed of light will not be able to traverse the space between them. He now makes the arbitrary measurement on one particle, and *voila!*—the other will be known to have exactly the opposite spin. However, since the observer could have chosen any axis at will, it would appear that the other particle knew about it just in time to properly anti-align along the same, arbitrarily chosen, axis.

The world of the Indivisible Whole appears again.

This result of Bell's theorem is exact in the mathematical sense. It depends only on the notions of standard analysis—the probabilitly interpretation of the psi-function and the QM -allowed types of mathematical operators. It is, however, at this stage that the crux of the problem facing us is revealed. There must be a "dictionary" for translating Bell's inequalities into observational terms, and then yet another word list for putting it in philosophical perspective. All of QM works backwards from our observations, saying that the reality of the measurement is fixed by our choice of directions in which to measure.

Martin Gardner begins his excellent essay "Quantum Weirdness" with the following quotation from a baseball umpire; "some is balls and some is strikes, but until I calls 'em, they ain't nothing". We can continue this baseball analogy further in an explication of Bell's theorem. Imagine that we have a mythical ambidextrous pitcher who hurls two balls simultaneously in precisely opposite directions. We know in advance that one ball is blue and the other red but that they are otherwise identical. We give two catchers this rule of the game; Each is to call out the color of his ball as soon as he catches it. Thus, if the first one shouts out the color of the ball he receives as soon as he gets it, we will then know with certainty the color of the other one. Let us imagine, however, that after the pitches are thrown, at the last possible instant, one of the catchers capriciously takes a few steps backwards. This could change the order of the call, so that if the red ball would have been first we now have it as blue. Has this changed the colors of the balls in flight? Have the baseballs known in advance what the catcher would do and have they changed color in flight to accommodate the strategy? Obviously not. Yet this is the way in which the Bell theorem is interpreted by many folks of a philosophical bent.

Now, if we make these electrons and positrons, and assume that only the charges differ and that the catchers have charged mitts, the charges of which they can freely change at the last minute, the situation is closer to that imagined in Bell's experiment. Again, it would be nonsense to assert that the charges knew in advance what the charges of the glove would be.

There is nothing in this to aid the paranormalists, yet as soon as it is clothed in the language of QM the situation changes. The wave packet takes on the appearance of something that can circumvent the laws of everyday physics, an entity that knows its structure throughout spacetime at once and which can be altered by some form of action at a distance. In short, the "geistwellen" of de Broglie have suddenly been transformed into real ghosts. The paranormal phenomena that require some explanation can be incorporated into the quantum theory by this advanced knowledge of the state of the world on the part of every constituent physical entity.

In the press recently, following the successful corroboration of QM by Aspect *et al.*, a number of reports stated that action at a distance had at last been confirmed. Aspect and his colleagues found that Bell's conjectural thought experiment is in fact what is realized in the laboratory. Put another way, Bell's theorem must be violated if QM is right, and if local measurements are not the sole determination of a body's properties. Several critical discussions of the uses of QM in parapsychological studies have been given in various places, but perhaps the most telling is the use of the methodology by the PPs themselves. The most recent is by Nash, which represents a theory of extrasensory observations. His basic argument is that the extrasensory participation in the state of the system by the observer is felt before the direct measurement is made on the system, thereby causing a collapse of the state function for the system prior to direct measurement. That the system chooses which state it will be in on the basis of the ESP mode of interaction is not discussed, nor how the observer-to-be manages to control the state that the system will achieve.

This experiment is proof to the paranormalists not only of some form of action at a distance, but even more. To quote Zukav:

> Superluminal quantum connectedness seems to be on the surface at least a possible explanation for some types of quantum phenomena. Telepathy, for example, often appears to happen instantaneously, if not faster. Psychic phenomena have been held in disdain by physicists since the days of Newton. In fact, most physicists do not even believe that they exist.

Zukav's comment that telepathy "appears to happen instantaneously, if not faster," seems to hark back to the tachyon, the hypothetical faster-than-light particle so popular about two decades ago. But let us continue with his invocation of Bell:

> In this sense, Bell's theorem could be the Trojan Horse in the physicists' camp; first, because it proves that quantum theory requires connections that appear to resemble telepathic communication and second, because it provides the mathematical framework through which serious physicists [all physicists are serious] could find themselves discussing types of phenomena which, ironically, they do not believe exist.

It should be understood that Bell has never made such claims. His articles on QM theory of measurement have been sober and balanced, pointing to the necessity for studying in detail the consequences of QM predictions in light of classical concepts of local causation. The more ardent among his popularizers, though, have not let themselves be hindered by this conservatism. Zukav even references Targ and Puthoff in his footnote, who are referred to as exceptions among physicists in holding paranormal beliefs.

Targ and Puthoff, in *Mind-Reach*, invoke Bell's theorem as follows:

> This Quantum Connection is codified in a theorem of great elegance known as Bell's Theorem. This theorem emphasizes that no theory of reality compatible with Quantum Theory can require spatially separated events to be independent. Rather it must permit physically separated events to interact with each other in a manner that is contrary to ordinary experience. This aspect of modern theory, which is experimentally tested and confirmed, reveals that parts of the universe apparently separated from each other can nonetheless act together *as parts of a larger whole* [emphasis added], a statement more expected to be found in mystical writings than in a theory of physics.

Bell's theorem is concerned with the outcome of measurements on systems that obey QM. That is, as has been said of other theories of measurement, the predictions of QM are obeyed by quantum mechanical particles—a somewhat circular statement but an important one for understanding the nature of the theorem. After the particles separate it seems a natural assumption that they retain their correlated state; thus, any measurement of one particle can predict with certainty *exactly* the state in which the other particle will be measured.

In conclusion, some discussion of a few basic objections to the paranormal uses of science are in order. For the sake of discussion, let us dub this kind of theorizing *psience*, for contrast.

In any physical theory, the basic test of the theory and its atten-

dant and necessary models is calculation and observation. A theory that serves simply to provide post hoc explanations serves no pourpose other than as a convenient tool with which to organize a diffuse body of empirical data. The ultimate use of these theories is to do more. That the data are collected is very nice, but the unification of these phenomena can only be achieved once the underlying causes are perceived, tests of these causes proposed, and the results of the tests predicted. This is precisely the opposite of psience.

In the realm of psience, any phenomenon is a thing in itself. There are no attempts to discover direct, causal relationships among these phenomena. As Bunge has pointed out, there is a lack of overall axiomatics in the conduct of inquiry. However, another point has been missed. The psientist, like the popularizer of normal science, is content to stop at the analogy. If a field of normal science presents what appears, by linguistic or pictorial analogy, a model having some of the same properties as the phenomenon the psientist is investigating, he will immediately grasp it and make it the explanation for his findings. As we have seen, there are similarities between the philosophical underpinnings of QM and some paranormal phenomena. That should not imply that there is any direct model-explicans link between the two realms. Yet the jargon of QM has become so diffused into psience that the vocabulary has become an explanation in itself-buzz words have become a replacement for calculation. This is a pathological state of scientific investigation, not normal science. It is indeed true that science has more than its share of punsters and jokers—one need only call to mind *glueballs, quarks, selfish genes,* and *hopping electrons*—but these are the clothing on the body of the theory, the mode of discourse only and not its substance.

An example of this use of jargon to replace results is the article by Whiteman in the *Handbook of Parapsychology:*

> It seems therefore that any attempt to unite parapsyschology with physics should adhere, substantially at least, to the language of quantum field theory in terms of "as if" fields at a level of creative potentiality.

Whiteman attempts to take the analogy of fields into the domain of the creative potential of the mind, by twisting the word *potential* (meaning possibility) to fit *potential field*—the chosen representation of the action of a force at the microlevel (as in magnetic or other particle exchange-induced fields). He goes further.

> Thus above, and below, the level of scientific laws, which are substantially field equations, there is a cutoff in normal scientific thinking. The "laws of uni-

versal causation" appealed to by opponents of parapsychology and the behaviorists.... [reference omitted] do not exist in the form supposed.

To speak of wave functions for a system and not discuss the Schröedinger or Dirac equations, to speak of action at a distance without relativity or electrodynamics and Maxwell's equations, to talk about backwards causality and not mention the details of the Boltzmann equation or the Hamiltonian of the many-body system, is to behave like Mrs. Malaprop in *The Rivals*, who used to "deck her dull chat with hard words which she don't understand". No calculation within physics has ever produced a psientific result—nor can it, according to the psientists' own mode of conduct.

The psientists are not interested in results—only phrases. And in that guise, they have successfully hoodwinked many into thinking that they too can speak prose, like Moliere's bourgeois gentleman, when within the context of normal science they have been doing so all of their lives. The physical world is understood not by speaking about it, or using colorful language to picture it, but by empirically and theoretically (mathematically) dissecting it. It is only, I believe, within this frame of mind that we will ever be able to peel away, in Plato's words, the veil of the unknown. That is only achieved by the action of manipulation, physically and intellectually, and not by blowing out hot air.

(*The Skeptical Enquirer*, Vol. IX No. 1—Fall 1984)

SWAMI VIVEKANANDA ON SUPERSTITION

(Extracts from The Complete Works of Swami Vivekananda)

I believe in reason and follow reason having seen enough of the evils of authority, for I was born in a country where they have gone to the extreme of authority. (Vol. 2, Page 336)

Superstition is a great enemy of man, bigotry is worse. (Vol. 1, Page 15)

Down with all superstitions! (Vol. 1, Page 502)

Be pure, give up all superstitions and see the wonderful harmony of nature. Superstition gets the better of religion. (Vol. 2, Page 483)

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Quackery:
'A Massive and Growing Problem'

Kendrick Frazier

Quackery costs the American public in excess of $ 10 billion a year, concludes a landmark study by the Subcommittee on Health and Long-Term Care of the House Select Committee on Aging. This subcommittee is chaired by Congressman Claude Pepper of Florida.

A comprehensive and hard-hitting committee report, *Quackery: A $10 Billion Scandal* summarizes the results of an intensive four-year review of quackery and its effects on the elderly. More than two dozen committee staff members, four dozen medical and scientific specialists, and persons from five federal agencies were involved in the study. "It is the most comprehensive investigation of medical quackery and related health care frauds ever undertaken" said the report.

The committee defined quackery in clear terms: "As used in this report a quack is anyone who promotes medical schemes or remedies known to be false, or which are unproven for a profit". At another point it refers to quackery as "the promotion and sale of useless remedies promising relief from chronic and critical health conditions".

The report covers quack treatments for arthritis, cancer, and aging; witchcraft and spiritual healing; cure-alls and "other curious cures" paper promises; quack devices; and self-styled clinics and other organized quackery. It also examined enforcement efforts against quackery.

"Quackery has traveled far from the day of the pitchman and covered wagon to emerge as big business", Pepper writes in the preface. "Those who orchestrate and profit from the sale and promotion of these useless and often harmful 'health' products are no longer quaint and comical figures. They are well organized, sophisticated and persistent".

The $10 billion monetary cost of quackery is only part of the loss. Said Pepper "The cost of quackery in human terms, measured in disillusion, pain, relief forsaken or postponed because of reliance on unproven methods, is more difficult to measure, but nonetheless real. All too frequently, the purchaser has paid with his life".

The committee found that the impact of quackery has been increasing and growing in sophistication. At the same time, public and private efforts to combat quackery "have diminished, been redirected or disbanded". Of the many federal agencies having various responsibilities for the program, "Only the U.S. Postal Inspection Service maintains a proactive program to identify quack products sold in violation of federal statutes". The Food and Drug Administration was once a formidable anti-quackery force, said Pepper, but now directs "less than 0.001 percent of its budget to the control of quackery".

"Quackery reflects pseudoscience at best" said the report. It noted that modern-day scientific knowledge has changed but not diminished it. "It has in fact grown in size and sophistication. Quackery now invades nearly every aspect of our lives, and at points attracts adherents with near religious zeal".

"Medical quackery is a massive problem. It is growing at an alarming rate". The amounts spent on quackery "dwarf what is spent for legitimate research". The study found that "thousands of people every year suffer needless injury and death". Phony cancer cures are the biggest fraud, followed by questionable arthritis cures and anti-aging remedies, the study found.

Examples of questionable arthritis remedies discovered by the study included bee venom, ant venom, sex hormones, cocaine, and green-lipped mussel extract. Phony cancer cures included eating grapes, ingesting ground-up diamonds, drinking the juice from Easter lilies and taking coffee enemas. Quack devices included an ordinary vibrator promoted as an arthritis-curing radon generator, the spectrochrome (essentially a metal box with a 1,000-watt lightbulb in the center), and the "solorama board" (essentially a heating pad).

The fastest growing "and maybe the most profitable of questionable medical remedies" are phony "youth cures". The committee found that one promoter was making more than $ 110,000 a day in sales of phony diet pills. Another made $ 13 million in nine months on a phony hair-restoring nostrum.

As for witchcraft, psychic healing and spiritual healing, the committee found all sorts of bizarre remedies promoted, from voodoo to "psychic surgery" to fried frog juice (as an arthritis salve). So-called spiritual healers "promise cures over the telephone once they have received the sufferer's money.... The committee could find no scientific evidence that any of these methods were effective".

The committee investigated thousands of ads promising questionable health benefits. It found more than 90 percent of these questionable ads to be fraudulent. The claims ranged from the mild ("How I cured my dog of arthritis") to those that were "deadly dangerous and not the least humorous.... About 75 percent of the products reviewed could be said to be potentially harmful".

"Quackery is an enormous problem with a severe impact on the health and well-being of our citizens", the committee concluded. It called for a "full-scale, concerted effort" involving federal, state, and local agencies to begin to make a dent in the problem. Stringent criminal penalties are necessary, including "at a minimum" an increase in sentencing to five years in prison and a $5,000 fine for each violation. Evaluation and enforcement efforts need to be boosted commensurately (e.g., the Postal Service needs to be given the power to compel testimony under oath, a right it does not now have) and funding for scientific research into arthritis and cancer should be increased.

Contributing to the problem are widespread public misperceptions. A joint federal study "found the nature and prevalence of fallacious or questionable health beliefs to be enormous". Three-fourths of those surveyed believe that extra vitamins provide more pep and energy. One fifth thought diseases like arthritis and cancer are caused by vitamin or mineral deficiencies. The committee found that purveyors of quackery thrive on public misinformation and misunderstanding. They offer bogus panaceas, make large profits, and then become "respectable".

"Beneath their mask of respectability lies more harm than just the dollars diverted from those in need", the study concluded. "Their take includes the health that could be protected and improved by proper medical procedures. It must also be measured in terms of disillusion, despair, misery, and death".

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Prophecy: The Search for Certainty

Charles J. Cazeau

Tomorrow morning thousands—or, more likely, millions—of people across the country will open their morning newspaper, turn to the horoscope page, and read something like this:

> Someone you will meet at a party may help you get the financial backing you need. A new romance could blossom into a lasting relationship. Trust your instincts in a confrontation with a neighbor.

It would seem that whoever wrote those words is able to glimpse into the future and tell each of us something about our own personal fate. Are there people who can really do this? There are probably few things more tantalizing to the human mind than the thought of being able to pierce the veil that shrouds future events. Think of the power. To know what will happen to other people, coming events, and the course of history. One possessed of such ability would be almost guaranteed instant wealth by foreseeing and acting upon stock prices, results of major sports events, and lotteries. On the other hand, the prophet involved may be without materialistic leanings (as many claim). Perhaps merely the fame and reputation is enough. To command awe and admiration as a seer from less gifted individuals is certainly heady stuff. There are many people in modern society who claim to have this gift of prophecy. There are also armies of followers of past prophets who see things fulfilled, thus offering proof of the veracity of prophecy. A large majority of people register uncertainty but tacit acceptance of claims that some people have this power.

Prophecy goes back to the beginnings of civilization. Prophets of Babylon were sorting through livers and intestines of pigs and sheep more than five thousand years ago looking for portents to guide their king or ruler. The rise of prophecy coincided with astrology, a more physical, or mechanical, method of forecasting

compared with the intuitive means of the prophet (e.g. dreams and trances). Either way, attempts to predict the future spread into Egypt, Greece, and other places. Prophecy was a profession and formed a special social class, with its own schools to train budding prophets. The Oracle at Delphi was famous for more than a thousand years. The "Oracle" was usually a virgin dealing out advice (for a fee) while in some kind of trance brought about by self-hypnosis or perhaps by the use of drugs. The oracles of today still ply their trade. They use crystal balls, tarot cards, tea leaves, Ouija boards, computers, or simply "mental power". Such paraphernalia are more antiseptic than the entrails used by ancient prophets.

The Need for Prophecy

The viability of prophecy resides in the innate need to know the future. It is certainly understandable. Confronted with the complex assemblage of factors we call the environment in which a person must survive (food, shelter, protection from enemies as well as sexual triumphs and other ego-building events), at any time there can be a feedbac of self-doubt, of uncertainty about one's self. As long as there is doubt and uncertainty there is anxiety and fear, whether we are talking about a starving Neanderthal or a modern suburban businessman. There has always been the need for protection against an uncertain future. The Neanderthal sharpened his spear and looked to the skies for some sign: the businessman studies stock-market forecasts and takes out more insurance. For many, the question is, Is the future foreordained ? And, if so, who can tell me what is in store ?

That so many people have posed this question throughout history is reflected in enduring stone monuments like Stonehenge and the Great Pyramid of Cheops. There is, as we know, good evidence that Stonehenge may have served as an astronomical observatory with the capability of predicting the positions of the sun, the moon, and the planets and their eclipses. These in turn may have laid the grounds for meteorological and agricultural forecasts. The Great Pyramid may have served as a giant stone calendar to determine when the Nile would overflow its banks and other natural events. Remnants of a "shadow floor" on the north side of the Great Pyramid suggest that markings there denoted solar positions during the year. In short, concern about one's fate is universal in time and place. It is only a small step from being able to predict astronomical

events (which are indeed real predictions) to the persuasion of a populace that the future *can* be known, and then generalized to the petty and the personal, a condition of belief both unfortunate and pathetic for the gullible.

We Are All Prophets

There are certain inevitable future events that any person can predict. The sun will rise tomorrow (it can even be predicted to the minute): you will grow older and will die someday; water will rise five feet along the Atlantic coast at the next high tide; there will be a major earthquake during 1982. The list of absolute and virtually certain prophecies is actually a long one. By the way you can't miss on an earthquake prediction. There are a million earthquakes a year, and a major one every two or three weeks somewhere in the world.

There is another list of futuristic events that are not so certain but which the individual has a good chance of actualizing by manipulating events in the present. For example: You conceive the idea that you would like to own your own business someday. You save money, invest, work hard, and this comes to pass. More mundanely, you wish to see a certain football game next fall. You buy tickets and make plane and motel reservations. Chances are you will be watching that game next fall. In a sense, college students are attending classes and working for a degree to assure themselves of the self-made prediction for a higher quality of life. Thus we can all be prophets.

The type of predictions referred to above are rather self-evident. Unique human events, such as whom Prince Charles would marry, whether a president will be shot, or if Fidel Castro will catch pneumonia next December, are the most chancy to predict. Let's take a look at some of those who say they can do this.

The So-Called Genuine Prophet

A modern prophet of wide acclaim is Jeane Dixon, who lives in Washington, D.C. She writes astrology columns for television and many newspapers, advising millions of people daily about how to conduct their lives and about their future. One of her devoted admirers, Ruth Montgomery, has written *A Gift of Prophecy*, a book about Jean Dixon's life and "powers". Dixon says that her power comes from God and that she has a special mission—a message to spread to mankind. This is quite a mouthful and it is logical to look for the basis for such assertions.

A Gift of Prophecy is a gushy, gossipy mish-mash of praise for Mrs. Dixon. It makes clear, however, that the linchpin of so-called prophecy that catapulted Mrs. Dixon to fame was the alleged prediction of President Kennedy's assassination in November 1963. The popular version is that Mrs. Dixon foresaw that Kennedy would be shot and killed if he went to Dallas. Actually, her prophecy was made several years earlier and stated simply that the 1960 election would be won by a Democrat—which is not too startling when you consider that a Democrat had been president for about 30 of the previous 50 years. However, she also predicted that this president would die (not necessarily be assassinated) while in office, but not necessarily in his first term. That gave her eight years to play with; and since presidents are usually elderly, they do sometimes die in office, plus the fact that they are always subject to the threat of a kook with a gun who wants to make history. Dixon did not mention the name Kennedy, the city of Dallas, or any dates. This, then seems to be anything but a dramatic prophecy. As 1960 approached, Mrs. Dixon had a vision of the next president as young, blue-eyed, and brown-haired. Despite John Kennedy's fitting this description (as did thousands of other people), Mrs. Dixon announced that Kennedy would *not* be elected! Does it require a Divine Source to construct such flimsy prophecies? Vague prophecies have a habit of becoming notoriously specific after the event. We read in *They Foresaw the Future,* by Justine Glass (p. 224), that Mrs. Dixon also specified the exact day of Kennedy's death, that he would be shot in the head, and that the assassin would be Oswald. I know of no evidential foundation for these specifics except in the imagination of the believers. One of the most disturbing things is that nobody mentions the failed prophecies. They seem to be conveniently forgotten. Most "psychics" make many prophecies about a wide range of events, apparently to increase the odds of getting a hit. Mrs. Dixon, for example, made the following prophecies, among many others on record.

Prophecy	**Comment**
Russia will be the first to put a man on the moon.	Wrong.
Shriver and Nixon will serve their country well.	Dixon also said she had foreseen Watergate.

Prophecy	Comment
Fidel Castro was either dead or in China (in 1966).	He was neither.
The Vietnam war would be over in 90 days (in 1966).	Wrong.
There is a great future in store for Senator Edward Kennedy.	How come Dixon missed Chappa-quiddick?
Russia will invade Iran in 1953.	This did not happen.
Russia will invade Palestine in 1957.	This did not happen.
Walter Reuther would make a bid for the presidency.	He did not.
Robert Kennedy would decline in popularity during 1967.	But not that he would be shot and killed in 1968.
Jackie Onassis would be involved in international diplomacy (in 1977).	We're still waiting.

Let us turn next to Nostradamus, an earlier and renowned prohet, believed by many to have been the greatest of all time. This sixteenth century astrologer and physician left us with a legacy of predictions spanning the centuries from his day to the present, as well as several prophecies that are perceived as yet to be fulfilled.

Nostradamus compiled his predictions in groups of 100 called "centuries". There are ten centuries, all complete except for Century VII, which has 42 prophecies for a total of 942. Each prophecy is in the form of a quatrain, or four-line verse. Unfortunately, since the quatrains are extremely obtuse, written in archaic French (even for the sixteenth century), and couched in elaborate symbolism and code, according to believers these quatrains only become clear after the event. They require not only translation, but also interpretation. That leaves the passages open to almost any interpretation.

According to a recent television program narrated by Orson Welles and advertised as "The Man Who Saw Tomorrow." Nostradamus was supposed to have foreseen the atomic bomb, air travel, submarines, Hitler, the assassination of John and Robert Kennedy, and a third world war. Before getting carried away by all this, it should be noted that the television program, labeled as "controversial", was anything but. Its main thrust was to persuade

viewers that Nostradamus was uncannily correct in seeing far into the future—without error. There was barely a murmur of a suggestion that Nostradamus could be wrong. One scene shows soldiers exhuming Nostradamus' body during the French Revolution and finding a medallion lying on his chest purporting to predict his exhumation. That was rather strange, since Nostradamus was buried in an upright position.

Here is a Nostradamus quatrain supposedly describing a twentieth century air battle (Century I, quatrain 64):

> At night they will think they have seen the sun.
> When they see the half pig man:
> Noise, screams, battles seen fought in the skies:
> The brute beasts will be heard to speak.

This has been interpreted by Erika Cheetham. The sun at night is exploding bombs or searchlights, the half pig man is a pilot with goggles and oxygen mask, and the beast speaking refers to the use of radio. This is one of the more obvious of the great prophet's quatrains.

How about predictions about the Kennedy family? At least nine quatrains have been interpreted as relating to the asassination. Predictions mentioning "brothers" or "three brothers" are said to be about the Kennedys. I examined all these and found most of them to be rather vague. Here is one of the "more specific" ones (Century IX, quatrain 36):

> A great king captured by the hands of a young man.
> Not far from Easter, confusion, a state of the knife:
> Everlasting captives, times when the lightning is on top.
> When three brothers will be wounded and murdered.

Lightning on top is the firing of the rifle that killed John F. Kennedy, but neither John nor Robert was killed near Easter (November and June). Other elements here have no meaning.

Nostradamus has the reputation for giving precise dates of events. Let's check this out (Century VIII, quatrain 71):

> The number of astrologers will grow so great.
> That they will be driven out, banned, and their books censored.
> In the year 1607 by sacred assemblies
> So that none will be safe from the holy ones.

Interpreter Erika Cheetham (1973, p. 335) notes to her credit that "this dating appears successful when reading other commentators who all apply it to the Council of Malines of 1607, which banished astrology. But I can find no record of this council

existing at all. It was probably invented by a prejudiced commentator of Nostradamus!"

For a long time, everybody agreed that certain quatrains of Nostradamus applied to the era of Napoleon. However, at the onset of World War II they changed their minds and decided that Nostradamus was talking about Hitler's Germany. This point underlines how sensitive these predictions are to interpretation. For example (Century I, quatrain 57):

By reason of great discord the earth shall quake.
Revolt destroys the old order and lifts its head to heaven.
The King's mouth will swim in its own blood
And his front (face) anointed with milk and honey,
roll upon the sod.

This has been interpreted as relating to the beheading of Louis XVI of France. Fair enough, but since the quatrains are in no particular chronological order, might this quatrain equally apply to the rise of Adolf Hitler (the King) through revolt against Hindenberg's government, his persecution of the German Jews (own blood), and the front (the Russian Front), where at first the Germans were welcomed as liberators (milk and honey) by the Russian peasantry (the sod). The expression "roll upon the sod" might also be a foretelling of armored Panzers.

One more point to consider is that prophecies made for a vague and unspecified future and framed in ambiguous terms have time working in their favor. Here is another quatrain:

When the bald one shall come out of the East.
The earth shall tremble with iron.
Fire, blood, rust, frogs.
Then the long darkness begins.

Rather cryptic. Is this a Nostradamus prophecy of a specific event to take place during a 300 to 400 year period? I am willing to bet that during such a long interval of time, some event in the world will occur that seems to hit it right on the nose (subject to interpretation, of course). As a matter of fact, it is not a Nostradamus quatrain. I made it up myself about an hour ago.

To sum it up in the words of Ellic Howe, "Nostradamus composed them [the quatrains] with tongue in cheek, and... he was well aware that there is an enduring market for prophecies and particularly veiled ones".

Some Anti-Prophecy Arguments

A Foreordained Future, If some individuals really have the power to see future events, that would suggest that such events—indeed all events—are predetermined and immutable. I am not speaking here of the rising and setting of the sun or like phenomena that *are* inevitable for the next several million years, but of human events. These are the events that prophets dwell upon almost to the exclusion of all else. It is one thing to note the inevitability of the sun rising next year or a hundred years from now, and on the other hand to forecast that your cousin Billy will fall out of a window next Tuesday and skin his elbow. There is almost an infinite multiplicity of events large and small leading up to and influencing the actualization of any occurrence in the future that are beyond human power to perceive. Why should we think that Billy's skinning his elbow while falling out of a window was inexorably foreordained at the time the universe came into existence some ten billion years ago and that the knowledge of this was then placed in the mind of some privileged person?

Prophets Ought to Be Rich and Famous. Prophets should be listed among the world's most famous and wealthy people. Perhaps the nonmaterialistic psychic feels an obligation not to use the gift for personal advancement. Yet we have not heard of prophets turning over royalties for books and columns to charity.

Prophetic Dreams. There have been many prophets and even ordinary people who have received a true and documented prophecy while dreaming. Such dreams are often described as "uncannily accurate". But think. Consider that all people sleep. That is usually when a person dreams. Millions of people sleeping means millions of dreams. Assume that in the United States, with about 230 million people, one person out of every three recalls a dream within a 24-hour period. Then each week there are more than a half-billion dreams that people remember and can recount. That translates to more than 24 billion dreams a year in the United States alone, neglecting the other 4 billion or so other people in the world who are also having dreams they remember. Is it not likely that somewhere in this almost infinite legion of dreams someone hits upon an occasional future event purely by statistical accident that is later described as "uncannily accurate". You could lay money on it.

Nonprophecies. Nonprophecies abound among those who have

in one way or another established reputations as seers. Here is an example from Jeane Dixon's prophecies for post-1966 that are described as "astonishing" by her promoters:

> Our foreign policy should be motivated by the desire to protect American interests, rather than by "some mysterious humanitarian ideal". We should **not try to make over European nations in our own image, but rather accept the differences and work with them.**

Is this a prediction? Of what? It might have been a casual remark made by our Secretary of State. Yet such statements are robed in the aura of "prophecy".

External Signals. It is certainly true that "coming events cast their shadows before". Some "psychics" are adept at spotting these signals or assessing trends. For example, at the onset of World War II it did not take a prophet to foretell that there would be battles, that people would be killed, that there would be suffering and, ultimately, peace. In the same way, odds can be narrowed by the prophet who recognizes trends, such as the hostility between the Polish people and the Soviet Union. Forecasts can be made in a knowing way that there will be "trouble between the two, even armed intervention". At a more personal level, clever predictions for a celebrity can be based upon age, habits, health, personality, and character.

Track Record. Over the years prophets have come forth to make their predictions (including vague prophecies and nonprophecies) for the coming year or years. Such predictions have received wide circulation in popular books and tabloids. I made a survey of the predictions of America's "top psychics" for the second half of 1979 published in the *National Enquirer* (July 3. 1979).

There are dozens of predictions. I was unable to identify a single "prophecy" that came true during the latter half of 1979. Among the silly predictions, we find that, not one, but two Loch Ness monsters would be captured, that geologists drilling under the Arctic ice cap will find a fountain of youth, and that an oil boom in Arizona will solve our gasoline problems for good.

Conclusions

The observations that have been presented here indicate that the whole idea of personal prophecy is spurious. I see no science from those who claim it works. The notion of prophecy fulfills a human need that all of us share: to know what will happen to us. Self-proclaimed prophets, for the most part, prey upon this need, often in their own self-interest.

There are those who, in the face of no hard scientific evidence for prophecy, invoke Divine Guidance. Such prophets seem to be saying that (1) all events are perforce ordained, and (2) only a few have been granted by a Supreme Power the "gift" of seeing the future. Apart from the arrogance involved, this would seem to mean that we must accept a world in which there is an absence of control by human beings over their own destiny, including such trivia as what we decide to eat for breakfast next week.

Thus we would be led to the assumption that a Cosmic Being has created a universe in which all of us are mindless marionettes. More worthwhile is a world whose future depends upon constructive activities in the here and now. Better to make our own futures than sit around and wait for them to happen.

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MIRACLE

But Schopenhauer's books are still beautiful - except when some superstitious madness suddenly breaks out in them. But this, as we learn from the later development of the ancient, beautiful, simple doctrine of identity in India itself, seems to be its sad fate: it is all too ready to open to any silly nonsense that comes knocking gently at the door. Indeed, 'miracle is faith's dearest child'. And the more fine, subtle, abstract and sublime that faith may be, so much the more fearfully does man's weak, fainting spirit snatch at miracles, however foolish, to be its stay and support.

— Dr. Erwin Schrödinger,
Nobel Laureate in Physics

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Unsolved Mysteries and Extraordinary Phenomena: A Trench—Level Report

Samual T. Gill

The casual reader uncritically absorbs occult and pseudoscientific lore while dawdling over the current *Midnight Globe* in the supermarket checkout line. Contrary points of view are not to be found among the razor blades and chewing gum, and rational magazines like the SKEPTICAL INQUIRER seldom reach the mass of the general public. Rational habits of thought are not, of course, confined to any exclusive group, but those who most need to develop such habits are reluctant to have their beliefs challenged. The problem, then, of gathering an audience and illustrating the virtues of the uncommon and sometimes rather unpopular skeptical viewpoint remains a significant one. After all, it is in the trenches with the general public, rather than in academic circles, that the battle for rational thought will be won or lost. I resolved to do my own little bit in the struggle by preparing a series of lectures on paranormal phenomena.

In my town, in the state whose proud motto is "Show Me," there exists an organization called the Communiversity, which offers free, noncredit adult education in "Weight Control". "How to Fight a Traffic Ticket," and so on. The Communiversity also provides a forum for such courses as "The Origin of the Earth and the Nine Basic Races of Man", "Dowsing", and "Eckankar—A Way of Life". This last "reveals the best-kept secrets of the ages" and "dares to share the truth that has been kept under wraps as a control factor". Nestled alongside such startling revelations-to-be, my own course sounded pretty prosaic:

> UNSOLVED MYSTERIES AND EXTRAORDINARY PHENOMENA—The lure of the unknown has fascinated open-minded students throughout history. ESP, Atlantis, pyramids and ancient civilizations, UFOs, space gods, Bigfoot, and the Bermuda Triangle are only a few of the riddles that continue to baffle

us: Take a closer look at these enigmatic puzzles with me—and be ready for some startling conclusions!

Nevertheless, the hook proved to be well baited. A full jury of twelve good believers and true responded to the lure on the night of my first lecture. I conducted an anonymous pre-course attitude survey of the group before the class began. Students checked the phrase that most closely reflected their attitude to the statements below. Attitudes listed were "Strongly agree", "Fairly certain", "Undecided", "Not likely", and "Strongly disagree".

1. I believe we are being visited by aliens from outer space.
2. I feel Atlantis once existed and is the mother of civilization.
3. I feel that some people have the power to read minds and foretell the future.
4. I believe that some force, as yet unknown, operates to cause the mysterious disappearances in the Bermuda Triangle.
5. I feel that aliens from outer space have assisted humans in the past especially in their efforts to build pyramids and other immense ancient monuments.
6. I feel that some people can bend metal and otherwise affect material objects using the power of their minds.
7. I believe that there are strange creatures, unkonwn to science, such as the Loch Ness Monster, the Abominable Snowman, and Bigfoot, still roaming the world.
8. I feel that some people can leave their physical bodies dormant and take actual trips to other times and places by astral projection.
9. I feel that America's ancient civilizations, such as the Incas, Aztecs, and Mayas, must have come from somewhere else.
10. I feel science and government often cover up startling discoveries about the origin of mankind and current paranormal phenomena.

Out of the 120 separate responses recorded, 65 (54 percent) indicated strong agreement or fair certainty about the survery statements. ESP in general registered the strongest consensus of belief (3 and 6 on the survery), with scientific and government cover-ups (10) close behind. Space gods (5) and Bigfoot (7) also made strong showings, but UFOs (1) rather surprisingly did not. Seven of the 12 responses to the UFO question were in the "Undecided" "Not likely" "Strongly disagree" group. Equally surprising to me, at least, was the response to the statement about Atlantis (2): 7 of the responses were "Undecided", although a signigicant minority (4 responses) checked "Strongly agree". There seemed to be less polarity in this area than I had expected. Statement 9, suggesting occult origins for Aztecs, Incas, and Mayas, attracted the highest level of skepticism, without a single response recorded in the "Strongly agree"-"Fairly certain" group. This issue seems to have dropped off the occultist horizon. Astral projection (8), on the other hand, remained a hot and controversial issue, with 6 "Strongly agree" responses balanced by 6 more from "Undecided" on down.

Besides the 65 "believer" responses, I received 31 in the "Undecided" camp (26 percent) and 24 in the "Not likely" — "Strongly disagree" group (20 percent).

The course description had been designed to appeal to believers, and in the opening session I presented myself as a bona-fide psychic. I had a great stroke of luck at the outset that helped to firmly establish this role in the students' eyes. While waiting for class to begin I loitered at the entrance to the classroom building, having previously greeted early arrivals and exchanged introductions in the classroom itself. Waiting thus, I observed the hurried approach of a young woman. She was unknown to me by sight, but I had already memorized the names of course participants. Mentally eliminating those who had already arrived, I picked a name at random from the three or four who had not and, taking a chance, so greeted the young woman.

"You're going to the 'Unsolved Mysteries' class, aren't you?" I then predicted artlessly.

My spur-of-the-moment name-guess was a direct hit, and the tale lost nothing in the telling whenverified before class by an unwitting accomplice—a practicing clairvoyant herself, perfectly prepared for psychic sensitivity in others. We were off to a flying start.

I briefly reviewed the high points of psychic research since the 1890s, touching favorably on the results claimed by the British pioneers, and on the experiments at Duke University and the Stanford Research Institute. The class was properly impressed, and when I had warmed up their mental muscles by "psychically" transmitting to them the triangle-within-a-circle figure I had drawn out of their sight, they seemed ready for the finale of my mentalist act. I announced I would psychically read what they would write inside a sealed, opaque envelope.

The act is, of course, a carnival routine at least as old as widespread literacy. Anyone can do it, using what is called the "one ahead" method. I believe I picked up the trick after reading Dan Mannix's entertaining little book *Step Right Up!*

The twelve students first secretly wrote a short phrase, word, or date on a slip of paper, then sealed their slips in opaque envelopes. The thirteenth "student" in the audience (actually an accomplice) wrote a message he and I had agreed upon beforehand. When

collecting the envelopes I crefully placed my shill's on the *bottom* of the stack. I then took the *top* envelope and began the "experiment", parodying deep concentration.

"This is a woman's message..." I hazarded cryptically, pressing my fingertips onto the manila envelope and gazing vacantly into space. "Definitely female vibrations". The name of my accomplice came to me next, after a couple of ever-closer guesses, and then I "stumbled" onto the fact that the subject had written a date inside the envelope. "It's a famous date, but that's not the context", I ruminated. "The date is December 7, but—but it has nothing to do with Pearl Harbor". I concentrated still harder for the class's benefit, willing those fluky old psychic powers to vibrate in my favor. At last it came to me! "It's your birthday, December 7, 1981, isn't it?".

My accomplice, suitably agog, confirmed that I was right while I opened the top envelope, saying when I had done so, "You actually wrote '12-7-81' but I was getting 'December'." This red herring helped to cover the fact that I wasn't verifying my accomplice's slip at all, but actually reading another student's. I then threw the opened envelope into the wastebasket, pulled a second envelope from the top of the stack, and with appropriate mumbo-jumbo proceeded to verify "psychically" what I had just read. I could have continued in that fashion through the whole stack, but I felt it more impressive to do only five or six and then beg off, pleading exhaustion and extreme mental strain.

At one point I paused, saying I was receiving a particularly clear vibration—not from anyone's envelope. I reeled off a string of numbers—a license plate! Did any student's car carry that tag? "It's a beige-colored car, with a brown interior—looks like leather? I—I think it's a foreign make". I prompted. Sheepishly, a young couple in the audience admitted that the car was theirs, and that the husband "had been thinking about it". No one seemed to suspesct (then) that I might have merely looked out the window into the building parking lot before class.

Concluding the performance then with my impression of a wrung-out murder suspect at the close of a grueling third-degree, I rang down the curtain after half a dozen startlingly correct identifications. "I hope", I quavered, "that those skeptics among you—and I sense their presence psychically—have been shown that there really is convincing scientific basis for belief in the powers of extrasensory

perception... And if you have been so convinced, I would now like to take this opportunity to talk to you about buying some beach-front property in Florida".

There is a stock scene in movies where the humble shepherd or foppish playboy reveals himself at last as the rightful king, long-lost heir. Winged Avenger, or what have you, to the stunned disbelief of incredulous onlookers. Such a scene ensued in the classroom. Some students appeared angry at having been led down the garden path, but the interest of the majority had definitely been piqued.

In the discussion that followed, one acute observer described exactly how I had managed the deception and correctlly identified my accomplice. The realization that they could be taken in, which had been brought home so forcefully, put the more thoughtful members of the class in a mood for critically examining paranormal claims, which was indeed the whole idea.

For the remainder of the first session we discussed the lack of hard evidence for claims regarding telepathy, precognition, and psychokinesis. **I explained and demonstrated some charlatans' techniques for ESP tricks,** such as misdirection and simple sleight-of hand. We illustrated ten logical fallacies commonly found in occult and pseudoscientific literature, laying special stress on *non sequitur, circulus in probando,* and *ad ignorantiam* arguments. We exposed some statistics on the accuracy of currently popular "prophets", and I explained the experimental method of observation, theory, and test as the key to progress in knowledge. Pseudoscience, I told the class, depended on special revelations known only to the elect. After discussing Occam's Razor as a logical tool, we closed with the reminder that extraordinary claims require extraordinary proof and the assertion that the burden of that proof is on the claimant. With this background, the class was prepared to examine the myths of Atlantis and **the Bermuda Triangle legend when we met for our second session, one week later.**

We had another little bonus for our second meeting. One "true" psychic among our group had claimed psychokinetic powers as well and had volunteered to experiment with the class. I agreed to host two experiments, one devised by the psychic and one under controlled conditions. Rather to my disappointment, the "sychic" student, though profuse with excuses, was unable to make a light-bulb glow with "psi energy" even on her own terms. Still, I stressed to the

class the principle that absence of evidence is not necessarily evidence of absence and pointed out that a single test could hardly be conclusive. The experiment was a useful demonstration of the scientific method. We conducted it without, I hope, embarrassing anyone and yet graphically showing the students how to control an experiment in order to eliminate fakery, how to apply critical judgment, and how to wield Occam's Razor. Did our subject, we asked ourselves, have miraculous powers denied to all others and unknown to science, powers that could revolutionize the world? Or was it more likely that she just knew a trick the rest of us did not?

In this atmosphere we polished off the hoary old Atlantis legend and the Bermuda Triangle without much trouble. I used L. Sprague de Camp's *Lost Continents* and Lawrence Kusche's *Bermuda Triangle Mystery—Solved* as basic texts. I also relied heavily on selections from the following bibliography, which was distributed for class use:

General Works—

Exploring the Unknown—Cazeau & Scott
Myths of the Space Age—Cohen
The Ancient Engineers—de Camp
The Building of Cultures—Dixon
The New Nonsense—Fair
Fads and Fallacies in the Name of Science—Gardner
Scientists Confront Velikovsky—Goldsmith
Fact, Fraud, and Fantasy—Goran
Bigfoot—Napier
Flim-Flam—Randi
Broca's Brain—Sagan
Legends of the Earth—Vitaliano
Lost Tribes and Sunken Continents—Wauchope

Works on ESP:

Mediums, Mystics, and the Occult—Christopher
ESP, Seers, and Psychics—Christopher
The Magic Art of Foreseeing the Future—Cohen
Step Right Up!—Mannix
Psychology of the Psychic—Marks & Kammann
The Occult Conceit—Rachleff
The Magic of Uri Geller—Randi
Science and the Supernatural—Taylor

Works on Atlantis:

Voyages to the New World—Davies
Lost Continents—de Camp
Atlantis: Making of a Myth—Forsyth
Atlantis: Fact or Fiction—Ramage

Works on UFOs:

UFOs—Explained—Klass
UFOs—Identified—Klass
UFOs: A Scientific Debate—Sagan
Intelligent Life in the Universe—Sagan & Shlovskii

Works on Space Gods:

The Space Gods Revealed—Story
Guardians of the Universe—Story

Works on the Bermuda Triangle:

The Bermuda Triangle Mystery—Solved!—Kusche

Our final session, entitled "Occult Totems and Rubber Ducks", dealt with those long-discarded theories and oft-disproved "facts" that seems to crop up most regularly as seemingly inexplicable "puzzles" in the literature of the paranormal. We skimmed such topics as pyramid lore, Easter Island, Stonehenge, the Bimini "road," and the Tunguska event of 1908. More plausible theories for the "riddle" of the frozen mammoths, the UFO phenomena, and Bigfoot sightings were offered. Prophets and prophecies were examined more critically than some students had done before, and the lack of compelling evidence behind such popular theorists as Velikovsky and von Däniken was highlighted.

The intent of the course was not just to debunk popular mysteries, but to encourage students to examine paranormal claims on the basis of hard evidence, to beware of logical fallacies and rhetorical trickery, and to draw conclusions only after applying rigorous critical judgment.

Only four students (one third of the original group) remained interested enough to finish the final session and complete the post-course survey, a questionnaire identical to that given before the lectures began. Perhaps a competent statistician would be able to draw more information and conclusions from the final results, but the most significant fact I noted was the comparison between the "Not likely" "Strongly disagree" figures for the group before and after the course presentation. Skepticism was registered in only about 20 percent of the original responses. After the course, skeptical responses shot up to a whopping 73 percent. Undecided responses held about even, but only *one response* out of the 40 recorded in the post-course survey fell in the "Fairly certain"—"Strongly agree" group.

Did only the hard-core skeptics remain with me to the bitter

end ? I think not. The course was not designed to attract such people in the first place. The faithful four, judging from informal conversation, all indicated significant basic changes in their previous beliefs and attitudes towards paranormal claims. I judged it more likely that hard-core *believers* had dropped out, a normal enough reaction when cherished beliefs are challenged. The Communiversity's traditionally high drop-out rate had been in full force during a hot summer semester as well.

I feel the significance of the effort lies in demonstrating the popularity of paranormal topics as a means to gather an audience, the willingness of a significant number of believers to critically weigh claims against evidence, and the incalculable benefit of jolting even committed believers out of their certainty. I cherish the hope that the most loyal occultist would be unlikely to forget the moment of truth in the first session. This shock treatment alone will, I feel, have a pronounced effect on habits of thought in days to come.

Our hopes for the uncertain future, it seems to me, lie in cool rationalism, critical judgment, and careful consideration of evidence. Emotionalism, truth through revelation, and pseudoscience masquerading as religion (and vice versa) point the way only to madness. Irrational habits of thought are not just harmless eccentricities. They can be dangerous, as the dupes of Jim Jones discovered when they followed an occult trickster into the wilds of Guyana a few years ago and squirted cyanide into the mouths of little children.

Skepticism may, in some small way, help prevent such tragedies. That's what "Unsolved Mysteries" was all about, and I think that's one of the things CSICOP stands for as well.

(*The Skeptical Inquirer*—Vol. VII No. 1—Fall 1982)

INSIGHTS AND IDEAS

Skeptical scrutiny is the means, in both science and religion, by which deep insights can be winnowed from deep nonsense.... The well-meaning contention that all ideas have equal merit seems to me little different from the disastrous contention that no ideas have any merit.

— Carl Sagan
in 'Broca's Brain'

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Palmistry: Science or Hand-Jive?

Michael Alan Park

Along with reading tea-leaves and gazing into crystal balls, Palmistry—or "Chiromancy"—is surely one of the forms of divination that comes to mind for most of us when "fortune telling" is mentioned. This occult art has become part of our culture, although for most of us it is a fairly benign form of the occult, and more than likely it is something we rarely think about. Palmistry is, however, an old and well-established method of divination and provides a good example of a claimed paranormal phenomenon for scientific examination.

Some of my own research has been in the field of dermatoglyphics, which is the study of the patterns of ridges and furrows on the skin of the hands and feet—"fingerprints," although these patterns also appear on the palms, toes, and soles. The data utilized by palmists and by those of us in this scientific field of interest are similar, and in fact one area of dermatoglyphic research involves using finger-and palm-print data to "predict" certain aspects of people's lives. Thus we can examine two similar activities centered around the same general topic—one occult, the other scientific—to see how they compare in theory, method, and results. It is an opportunity not provided by other methods of divination such as those using tea leaves and crystal balls.

In scientifically examining the various "predictive" arts there are two potential approaches or levels from which one can work. The most straightforward is to examine the predictions and revelations to see if they are, in fact, accurate. This method has some obvious draw backs. For one, where predictions rather than revelations about personality are involved, the study would necessarily be a long-range one—the lifetime of the individual in fact. Secondly, as in any

scientific study, certain controls are needed. Here, for example, one would have to control for "self-fulfilling" prophecies: the possibility that the subject takes a prediction or revelation so seriously that, even if subconsciously, he causes it to come true. Especially with such things as personality characteristics and social matters, such self-fulfillment would be easy to bring about and hard to control for in a study. There is also the matter of basing occult insights on data that are not part of that "science." Scars, calluses, and stains on the hands, as well as such factors as mode of dress and speech pattern, can be interpreted à la Sherlock Holmes to "divine" some basic information about an individual as a basis for "revealing" further information. (A simple example: short nails and fingertip calluses on a person's left hand are a pretty good indication of a right-handed stringed-instrument player. From there, revelations concerning "musical talent," "creativity," and so on, would be fairly safe.) In palmistry, this can be taken care of to some extent by using ink-prints of palms rather than living subjects: but even where use of prints is advocated by the palmists themselves the necessity of also observing the living hand is made clear.

With predictive arts using tea leaves, crystal balls, tarot cards, and so on, we are usually limited to testing prediction; the relationships claimed by these arts find no analogues in any accepted scientific body of knowledge. As noted, however, the palmist and the specialist in dermatoglyphics are using some of the same data, and much dermatoglyphic research is concerned with the relationships between certain physical traits of the hands and feet and other aspects of individual biology. We can, then, test palmistry on the second potential level, that of examining whether or not there actually are any direct, predictive, specific relationships between the characteristics used by the palmist and any other events or factors in an individual's life that may relate to the kinds of information contained in the palmist's conclusions.

In attempting to define and describe the occult art of palmistry, some difficulty is encountered. There appear to be a number of different versions of the art that claim to be the "real" palmistry. The versions differ in the number of characteristics observed, in the kinds of characteristics observed, in details concerning the classification, nomenclature, and nature of those characteristics, and in the meaning attributed to different expressions of the characteristics.

Since it is not my intent to examine palmistry point by point but rather to discuss it more in terms of its general theory, I will attempt to generalize from points that all or most of the versions have in common or to find some sort of "average" statement that seems to fairly reflect them all. I will, however, include in my examination all the types of characteristics used in the most complex form of palmistry I came across, that discussed by Gettings (1979), which uses hand shape and fingerprints as well as the more typical lines and creases.

There seems to be no consensus as to just how old palmistry is. Recognition of individual uniqueness in fingerprint patterns goes back at least to China in the third century B. C., where a thumb-print impression on a pot of clay may have been used for personal identification. As to palmistry itself, *The Encyclopedia of Occult Sciences* (1939) mentions ancient India and Egypt. In its modern form it can certainly be dated back to publications of the sixteenth century. Basically, palmistry is the use of the lines and creases of the palm to discern hidden information about a person's character and in some cases to foretell future events in the person's life. The lines used are not those familiar patterns of the fingertips (which upon close examination can be seen to extend to the palm), but those creases on the palms and inner surfaces of the fingers that become deeper and more defined when we flex our hands. These are in fact formally referred to as "flexion creases" and are described anatomically as "locations of firmer attachment of the skin to underlying structures".

These creases are the most important data for the palmist. There are three major lines (called the lines of life, head, and heart) that are almost always present and a number of subsidiary lines that may be absent in some individuals. The characteristics of these lines that are considered by the palmist include: the points at which the line begins and ends: the degree and direction of curvature: length; presence of forks; depth; and presence of a "chained" appearance. The lines are explained in various ways and at various levels of causality—from an astrological "influence of the stars" at birth *(Encyclopedia of Occult Sciences, p. 150.)* to the lines as "conductors of energies from one part of the hand to another" In any case, they are thought to be an outward mainfestation of the inner state of the person possessing them, reflecting aspects of that person's personality characteristics, intellectual abilities, and even physique.

The question of the predictive potential of palmistry—the "fortune-telling" aspect—is not fully agreed upon. More traditional versions, like those discussed in de Givry, for example, accept this capability of the art. The best known example is perhaps the use of the "line of life" to determine an individual's approximate date of death. There are also recognized ways of foretelling such things as number of children, economic success, and other matters of life, and particularly love. More recent versions of palmistry, however, deny that specific events can be foretold. Gettings in fact calls such predictions the palmistry of " charlatans, gypsies, and popular articles in women's magazines". The best palmistry can offer by way of prediction, he says, are indications of "direction and tendencies". At the same time, however, Gettings does admit that on occasion external pieces of information can be arrived at—in one case the name of a subject's boyfriend and the fact that the boyfriend was married. Such information he says is derived "from unknown sources by the emotion", a process he calls "intuitive palmistry". There seems, then, to be some room left for the possibility of a clairvoyant capacity on the part of the palmist being set off by the palmar features. Finally, biologist Lyall Watson, who in *Supernature* (1973) proposes the possibility of a nonparanormal explanation for the connection between internal states and the features of the hands, says that "fortune telling by lines in the hands bears the same relationship to the serious study of [palmistry] as newspaper horoscopes do to true astrology" More on Watson later.

Especially in more current forms of palmistry, other features of the hand in addition to palmar creases are utilized. The form of the hand, specifically the shape of the palm in relation to the length of the fingers, is also considered to be a clue to personality traits, and Gettings links various "types" of hand-shapes with certain professions. The form of the individual fingers is also noted; the length of the little finger (the "finger of Mercury") and its individual phalanges, as well as the presence of any curvature, for example, are believed to give information about a person's honesty and dealings with the opposite sex and with money. Nail shape and color and the appearance of the fleshy parts of the palm (the "mounts") are of importance too. Last, and of special interest to me, is the use of fingerprint patterns. Again using Gettings as an example, it would seem that there is a recognized link within palmistry between

various dermatoglyphic pattern type and certain personality traits.

It must be noted that, as practiced by many modern proponents, "real" palmistry is not the simple matter so often depicted in the movies. Several hours are said to be needed to adequately take into account all the features noted above and to evaluate their meanings—both individually and, more important, in relation to one another. Which particular finger a certain print type appears on is important, and that must be viewed in light of the length of that finger, the shape of the palm, and the indications given by all the other features. A "reading" is not a list of individual meanings but an interpretation based on a consideration of the balances and conflicts indicated by all the individual features as part of the whole hand.

Dermatoglyphics may be generally defined as the study of the patterns of parallel ridges and furrows on the epidermis of the hands and feet. These are essentially the fingerprints so familiar to us in connection with law-enforcement work. However, whereas the police are interested in combinations of fingerprint traits that characterize individuals, the specialist in dermatoglyphics is interested in those traits that can be put into a finite number of categories, some expressions of which are exhibited by all persons. The most important and obvious of these traits is the pattern type. There are three main types: arches, loops, and whorls; there are also subtypes of each of these as well as some other, minor types. Every human finger and toe carries, with few exceptions, one of these types. In addition, there are areas of the palm and sole that also display these patterns. The other important trait used in dermatoglyphics is pattern size. It is determined by counting the number of ridges between the center of the pattern and the triradius—the point from which the ridges that outline the pattern proper separate. In studying these two sets of characteristics, other traits of the hands and feet, including palmar flexion creases, have been noted, and in some cases have been incorporated into dermatoglyphic research.

Any human trait that shows variation is examined to try to determine to what extent is variation is a result of genetic differences between people and to what extent it may be environmentally explained. It became apparent during such investigations that pattern types and sizes were under some degree of genetic influence, although the specific details of the genetic mechanism have yet to be discerned. At any rate, the demonstration of at least a partial genetic

basis led to two uses of dermatoglyphic data in other studies. One, of course, involved the examination of human "racial" differences. Dermatoglyphics were added to the growing list of traits whose expressions and frequencies help to distinguish and define the races. When it was seen that clear-cut boundaries between human races simply did not exist—and therefore that the whole concept of "race" needed to be viewed in a different light—the emphasis of studies of variable traits shifted to the search for explanations of the trait variation itself and to the use of the traits as genetic markers in research on the processes of human population genetics and evolution.

The second application of dermatoglyphic data and the one most germane to the present topic, is in the field of medical genetics. Correlations have been established between dermatoglyphic features and certain human disorders, most of which have a known or suspected genetic basis. Here then is a scientifically testable link between some of the palmist's data and some other features of human biology, some involving behavioral characteristics.

The genetic mechanisms behind most human features are extremelly complex; hence, we often get a clue as to genetic basis only when something goes wrong—when we can trace a specific disorder through family lines or can link one disorder with another or with some other particular physical feature. In this case, a good number of human ailments already established as having, or thought to have, genetic bases were seen to be statistically linked to particular features of the fingers and palms. It is not that specific, rare sorts of prints or lines are absolute "signs" of a particular genetic disease; it is just that samples of victims of certain disorders have unusually high or low frequencies of certain patterns or features when compared to the general population.

Several distinct kinds of disorders have been shown to have correlations with dermatoglyphic "abnormalities". A large portion of these ailments involve structural aberrations in the chromosomes—missing pieces, or chromosomes that are attached to part or all of another chromosome (translocations.) Others involve too many or too few chromosomes (aneuploidy); this can occur either with the autosomal (nonsex) chromosomes or with the sex chromosomes. A number of disorders known or thought to be the result of mutations of single genes are also listed as having dermatoglyphic correlations.

Finally, there are some conditions of uncertain genetic transmission and several disorders of external origin, such as rubella, thalidomide-damage, and cerebral palsy.

The dermatoglyphic "abnormalities" associated with these disorders include unusal frequencies of certain pattern types, unusually high or low ridge-counts for pattern size, unusual frequencies of a number of other dermatoglyphic features, the appearance of only one flexion crease on the inside surface of the fingers, and a particularly interesting feature known as the simian crease or line—where the two transverse flexion creases of the palm (the heart and head lines of the palmist) connect to form a single distinct crease.

As mentioned, the exact genetic mechanism responsible for dermatoglyphic features is as yet unkonwn. The correlations mentioned above, however, have shed some light on the problem. Other physical symptoms of many of the disorders studied in this context involve developmental abnormalities—aberrations that, in part at least, originate during the fetal period. Since it is known that the dermatoglyphic features develop between the sixth and twenty-first fetal weeks, it appears possible that these distortions in dermatoglyphic features have more of a mechanical explanation than a direct genetic origin. Other studies have suggested that pattern size may be under fairly direct genetic control, while pattern type is more the secondary result of the size and shape of the developing fetal fingertips. At this point one must conclude that the relation between dermatoglyphic features and genes is a complex one that also involves the effects of environmental factors, that is, factors relating to the development of other physical features and processes, factors perhaps of the internal environment of the womb, and may be factors involving the complex interactions of differing genetic combinations. At any rate, whatever the mechanisms at work, there is a recognized relationship between certain features of the hands and other aspects of human biology that results in specific enough manifestations to allow dermatoglyphics, with limitations, to be used diagnostically for "strengthening diagnostic impressions" and as "screening devices" to select patients for further studies and tests.

We may now examine some specific correlations to see if they resemble at all those proposed by the palmist. Again, using Gettings as an example of more recent versions of palmistry, we find the

prints of the fingertips used as indicators of certain personality characteristics. Only the three basic patterns are used. Arches are said to indicate "crudeness," "practicality," and "rebelliousness." Loops point to "restraint," "lack of originality," and "coolness" of manner. Whorls are indicative of a person who is "creative," "restless," and "egocentric".

In dermatoglyphic research, an excess of arches (as compared with frequencies derived from large population samples) is associated with a number of disorders. These include trisomy 18—a condition where an individual possesses three rather than two of the eighteenth chromosome—a disorder that usually leads to infant death. Kleinfelter's syndrome, where males have two instead of one X sex chromosome (XXY), also is correlated with an excess of arches. Individuals with this syndrome exhibit such symptoms as underdeveloped gonads, sparse body hair, some breast development, unusually long legs, and some mental retardation. Other correlated disorders include certain forms of congenital heart disease, idiopathic mental retardation, epilepsy with retardation, and according to some investigators, schizophrenia.

An excess of loops is associated with other forms of congenital heart disease and with another trisomy, trisomy 21, also known as Down's syndrome, or (unfortunately) mongoloid idiocy. This familiar disorder displays a number of characteristic physical features as well as mental retardation.

Whorls in excess of normal frequencies have been associated with another anomaly of the sex chromosomes known as Turner's syndrome. With this condition, outwardly physical females possess only one instead of two X chromosomes (XO). Most XO conceptions end in spontaneous abortions; but, when live birth does occur, characteristic symptoms of the disorder include very short stature, broad chest with underdeveloped breasts, webbing appearance of the neck, small uterus, and either no ovaries or those represented only by small "streaks" of tissue. There is no mental retardation. Other disorders correlated with excess whorls include Huntington's chorea, a neurological condition that results eventually in loss of mental faculties; some additional forms of congenital heart disease; and, according to other investigators, schizophrenia.

As I think can be readily seen, only with some semantic effort can any of these recognized correlations be construed as resembling

those of the palmist. It is interesting, however, that so many of the disorders noted include among their symptoms some sort of behavioral manifestation.

The set of traits by far the most important in palmistry are the flexion creases of the palms. As noted above, various characteristics of these lines are said to relate information regarding an individual's personality, intellect, physical form, and even future. As might be suspected, interpretive systems differ enormously, but the kinds of information divined always fall into one of those basic categories.

Essentially the only interest the dermatoglyphic specialist has in flexion creases is in their medical relationships. In this regard, there are only two crease characteristics that have been shown to be well correlated with genetically based disorders. One is the presence of a single flexion crease, instead of two, on the inner surface of one or more fingers. This anomaly, so far as I can determine, is not treated by palmists at all. Anatomically it seems to be associated with a lack of mobility of the underlying finger joint. Single digital creases have shown correlations with three disorders that affect the development of an individual in numerous and rather disastrous ways. Two of these are known to have a genetic basis. They are trisomies 18, which is fatal, and 21 (Down's syndrome). The other disorder is known as the oral-facial-digital syndrome. It is suspected by some of being caused by a trisomy of the first chromosome, though this has not been proved. It results in various deformities of the regions of the body that give it its name.

The second important flexion crease feature is the so-called simian line or crease (so named because of its presence in some nonhuman primates.) Found in under 2 percent of humans in general, this single line across the palm shows higher frequencies in victims of a number of genetically based disorders. Among these are: trisomies 18 and 21, Turner's syndrome, De Lange syndrome (various anomalies of the hands and feet). Ellis-van Creveld syndrome (dwarfism and polydactyly), psoriasis, Rubenstein-Taybi syndrome (broad thumb and great toe), idiopathic mental retardation, and two disorders of external origin thalidomide damage and prenatal rubella.

The simian line is also used by palmists (under that name). It is said to indicate "a strong inner tension". Depending upon the general personality traits shown by the other palmar and digital

features, this tension can display itself in a number of specific ways: creative and artistic, destructive and criminal, or religious.

As with the fingerprint patterns, it would appear that these correlations accepted for the flexion creases and those proposed by the palmist bear little resemblance to one another. Again, it is of interest, however, that so many of the disorders mentioned have symptoms that involve behavioral manifestations.

Finally, a characteristic used in palmistry but not in dermatoglyphics (except with regard to physical deformity related to genetic disorders) is that of hand shape. Again, specific features and interpretations differ among various systems of palmistry and among palmists. The essential idea, however, is the same—that the shape of the palm and fingers is a clue to personality characteristics. This is reminiscent of the physique and temperament correlations espoused by W. H. Sheldon (1942). Sheldon developed a system for quantitatively describing an individual's overall body build that consisted of three components each scored on a scale of 1 to 7. Sheldon further suggested that these genetically based component expressions were linked with expressions of personality or temperament, also described by three components scored 1 to 7. This subject is complex and is really a topic for another paper; suffice it to say that Sheldon's ideas, especially with regard to temperament, are seldom used today, in part because of problems of interobserver uniformity and in part because, as I have suggested elsewhere, the evaluation of types of temperament and of their correlations with body type may be under more influence from culture than from some underlying genetic basis. There is then, at this point, little scientific support for a biological connection between shapes of parts of the body, or the body as a whole, and expression of personality and temperament characteristics.

Obviously, a more detailed, point-by-point examination could be carried out comparing the findings of medical dermatoglyphics with the claims of palmistry. It seems clear enough to me, however, that the scientifically established connections between palmar and digital features and other aspect of individual biology offer no positive evidence in support of the relationships advocated by the palmists. This of course, does not preclude the possibility of some sort of connection beyond the bounds of this type of examination or even of our current knowledge. The probability, though, seems remote at this point.

For instance, Lyall Watson, to cite the only "scientific" example of which I am aware, proposes in *Supernature* that an intimate connection between internal physical and mental conditions and the lines of the palm makes sense, since the nervous system, sense organs, and skin are all derived from the same embryonic layer, and since so many diseases and mental states are known to have some manifestations or effects on the condition of a person's skin. The inside and outside of the body, in other words, are in constant contact and interplay throughout life. As evidence for this, with regard to palms, Watson claims that palmar creases "break down" at the moment of death, when signals from the brain, which have maintained them, cease. A check with the Connecticut State Medical Examiner's Office indicated that this claim was unfounded; I was told that the crease lines remain after death. At any rate, although there are certainly numerous intimate connections between parts of the body, I think Watson fails to provide any reason to believe that any of these manifest themselves in specific ways in the lines of the palms. The occult art of palmistry and the scientific study of the meaning and cause of dermatoglyphic features must remain, for now at least, two quite distinct categories of knowledge.

This does not mean, however, that there may not be some connection between the two in historical perspective. It remains to be explained just where the idea for palmistry came from in the first place. There are certainly other parts of the body that could be "read" for purposes of divination. It strikes me as possible that the concept may have originated as a result of observations of medical phenomena like those described above.

That this is at all plausible was made clear to me during my own research on dermatoglyphics. I was studying processes of microevolution among the Hutterian Brethren of Canada, using fingerprints as genetic markers. The Hutterites are extremely knowledgeable with regard to anything related to agriculture, but are fairly ignorant of many things outside that realm; in other words, I had no reason to suspect that they knew anything about dermatoglyphics other than the fact that "the government" took fingerprints. In the course of my work, one Hutterite man came to me and inquired about the "funny" line in his palm; no one else in the colony, he noted, had one. It turned out to be a simian line. I am fairly certain that his observation of it was not prompted by anything other than curiosity. It would

seem perfectly reasonable then that early literate or even preliterate human groups could have noted correlations between unusual palm and finger features and physical or especially, mental aberrations (observations that would have been much more obvious than that of my Hutterite subject's) and could then have developed broader ideas about the connections between these features and things like mental state and even future events.

To be sure, despite the lack of scientific support, and perhaps especially *because* of the clear distinctions between these two spheres of knowledge, those who "believe" in palmistry will continue to do so. After all, there is a certain comfort in having access to knowledge that is hidden from view or "hiding" in the future. And there is a certain discomfort in the ever-changing, never-absolute world of science. That my palm reveals my innermost being and my future life, that ancient astronauts built the amazing pyramids, that the mind can fix broken watches and locate archaeological sites—all these are intriguing and exciting and somehow comforting in their simplicity and absoluteness. It is an understandable emotion. Thus it is up to those of us involved in research like the above not only to examine (and often debunk) such paranormal phenomena but also to communicate the excitement and intrigue of *our* "occult" ("hidden" or "concealed") knowledge: the fascinating mysteries of black holes in space, of the extinction of the dinosaurs, of invisible particles smaller than atoms, and, yes, even of fingerprints and genes.

(*The Skeptical Inquirer*—Vol. VII No. 2, Winter 1982-83

SCIENTIFIC TEMPER AND MEDIA

What is the record of the media in our country in inculcating scientific temper in the people? This is a question which has been gathering significance as our mass media are being inexorably drawn into the orbit of the technological revolution. Without a wide social base for the concept of scientific temper, the introduction of new technology can only help to perpetuate among the masses the domination of obscurantism on the one hand and borrowed colonial culture on the other. A grotesque contradictions, indeed-while the media itself will be look towards the twenty-first century, the message that it will carry will either belong to the fifteenth century or the outworn values of the twentieth.

— Nikhil Chakravarthy

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Science and Superstition

Y. Nayudamma

When the innocent looking Vice-Chancellor of the Bangalore University Dr. H. Narasimhaiah the Vice-Chancellor without Vice suggested that I speak on Science and Superstition, I much hesitated and much debated. I know little of science: I know much less of superstition. When this beautiful city of Bangalore is fast developing new supersciences like Sai—ence and Saicharitry, where eminent scientists from higher institutes of learning are talking about miracles, supermen and supernatural, who am I and how dare I, speak about Sceince and Superstition—particularly so when the Indian scientific community and learned academies have been so discreetly silent about it?

When mystery men and miracle workers are making their presence increasingly felt: when from thin air master pieces of modern techonolgy are credited to be created; when some claim the power of foretelling the future and others, the ability to forestall it, as a student of science, I must confess I am clearly confused and concerned.

So I began to educate myself reading a number of books on superstition—as many as thirteen books (Superstitious 13!). Little did I realize that there is such a vast literature in English about superstition, though I could only trace two books in English about Indian superstitions.

The more I read the more I stand confused. I am not sure whether it has done me any good either.

What is Superstition?

Dictionary definitions are: credulity regarding the supernatural: irrational fear of the unknown: a practice: ritual or belief based on mysterious and misdirected reverence: an unreasoning awe or fear of the unknown tenet, practice: belief or opinion founded on fear or ignorance with no apparently rational basis: *Andhaviswas*—blindly

accepted belief or practice, an irrational religious belief or practice. Notice that combination of irrationally and religion. The trouble is that one man's religion is another man's superstition.

Apparently, superstition survives on fear, blind belief, unreasoning and irrational attitude.

What is Science?

Science is knowledge—an organised, systematic formulated knowledge based on observation, experimentation and induction.

The essence of science is the scientific method. No pronouncement, however sacred or high in authority, is accepted without experimental test or proof. Science has a built-in method for correcting its own mistakes. Science is both perceptive and deductive and thus has an element of creation and destruction. Scientific temper is an attitude of mind, an open rational mind, questioning curious critical mind-a tomorrow's mind instead of yesterday's mind—resistant to rigidity and resilient to change.

The distinction between science and superstition becomes increasingly clear. Science evolves, develops in a continuous correcting fashion and not subdued by the status or symbols of authority of fear of the unknown.

Classification of Superstitions

Superstitions are found all over the world in all walks of life concerning all activities, throughout history. Superstitions may be classified as connected with (a) religion,(b) tradition, (c) function or profession and (d) purely personal.

Eric Maple describes several superstitions connected with house and garden: works and travel; recreation and entertainment, rituals, body and clothes, folk-lore and magic, peasantry and people; psychic powers, etc. Khannas classifies the Indian superstitions concerning mother and child; pregnancy and delivery; disease and death; hygiene and health: travel and pilgrimage;omens, good and bad; sleep and thought transference, nature and natural phenomena, etc. Bijalwan, in the latest book of 1976, describes Hindu omens based on SHAKUNAUTI and *Shakuna Shastra,* like throbbing of limbs, sneezing, playing dice, etc.

Why Superstition?

Jahoda, in his book on "Psychology of Superstition", deals with many psychological aspects of superstition. The reasons are critically discussed by Maple. An attempt to explain away three

hundred Indian superstitions is made by Khannas.

Superstition is steeped in simple fear—fear of the unknown—in birth, death, disease, danger, despair, distress, doubt anxiety, uncertainty, stress and strain.

Superstition is the acceptance of superior unknown power which can be made to submit to human will; to control, or to offset the unkown evil. It is a protective barrier against a sense of helplessness. Where chances and circumstances are not fully controlled by his knowledge, man turns to magic and superstition.

Superstition is a mode of thinking—a part and parcel of mental make up; liable to come to the surface under certain circumstances: superstition stems from an emotional attitude. Language, folk-lore, tradition, religion—all combine and shape the growing mind into a common mould favouring a persistence of superstition.

Superstition is also the result of 'conditioning of the mind' by the hostile environment and tradition 'speak of the devil—he is sure to appear!'

Superstitions being the idiom of the people, are taken with the mother's milk so to speak and become integrated with the language of thought. Superstition is the name of the game by which mankind seeks to protect itself—from the enemy of survival.

Superstition is also closely connected with the childlike curiosity of human mind—noticing the mystery of nature; looking at life with awe and wonder—trying to interpret the unusual happenings around man: to find order in disorder: 'one in many'— unity in diversity: interpreting coincidences and correlations. Instinctively man sees meanings in the unusual things happening —which are more intuitive than rational, *e.g.* a neem and pupil tree grown together; crystal clear water coming from a hill.

Some superstitions are designed to educate people about health and hygiene; safety, security and stability, economic new necessities, *e.g.*, a sacred cow and finally become a way of life. As time passes by the reason behind is forgotten and the shell remains.

'Superstitious man believes in what he *wants* to believe or what he *needs* to believe'.

When emotion and fear get in reason and confidence get out resulting in superstition giving an imaginary control over hostile environment. Superstition in essence is a kind of insurance against hell and then hesitating to pay the premium.

Science-Superstition-Spectrum (SSS)

Now let us look at science and superstition closely.

Science or superstition is basically an attitude of mind-one rational, the other emotional and irrational. Observation, in little known fields are difficult to interpret. Here comes the difference. Superstition goes by personal blind beliefs and revelations, whereas science goes by experimentation. Superstition is a relative concept dependent on the state of scientific knowledge at a particular point of time.

Do you also notice now the close realtionship between ritual part of religion and superstition as contrasted to science. Both science and religion are seekers of truth: make one feel humble; both act on faith (religion on blind faith): both act as a cementing substance between people and both set a code of conduct. On the other hand, the ritual part of religion is more close to superstition.

Surely, science and superstition coexist but are not complementary. Scientific knowledge is a rational process in which dogma, rigidity, revelation, ritual, mystic belief and miracles have no place.

This science-superstition-spectrum has thus at one end the scientific society evolved by socialist systems where scientific attitudes rule supreme and at the other extreme, the mass of humanity where superstition and dogma are the principal deities.

Juxtaposed between these two is a developing nation like ours where the new and the old, science and superstition coexist and continue of affect the lives of our people. This sort of an amalgam is nothing peculiar to us. It has been there in the West. And the course of science, like that of love, never runs smooth. Superstition has often been the speed-breaker of science. Historians and sociologists of science have tried to find answers why this has been so. Merton in his 'Science, Technology and Society in the Seventeenth Century England' conceived of science 'as a cultural artefact, a manifestation of intellectual energy that is stimulated, checked or modified by the structure, beliefs and aspirations of the society with which this scientific activity is associated'. He concluded that the scientist's choice of problem was much influenced by socio-economic considerations.

Even highly educated people in our courny are known to wait for the auspicious hour, day or the week in order to start an activity.

The belief in *rahu kalam* and *yamagandam* (inauspicious hour) is common place.

Superstition has it that the eclipses are caused by the demons *Rahu* and *Ketu* devouring the sun or moon. Much after man has landed on the moon, our people—not a few of them professing to be scientists— give a lot of weightage to horoscopes. To cap it all, if found 'wanting' from the view point of celestial combinations, people are advised to perform religious ceremonies to ward off evils.

Belief in life after death is not uncommon. As Julian Huxley puts it, "belief in a supernatural after-life leads to concentration on attaining salvation in the other world and to a lack of concern for life in this world and its possible improvement". Also, "belief in supernaturalism and the miraculous and magical elements which go with it always leads to gross superstition, and, usually, to its financial exploitation".

This is the crux of the problem. When millions are dying of hunger in one part of the country, large quantities of food-stuff (ghee particularly) are known to be consigned to flames in the name of a *yajna*. All because some wise men have thought it fit to exploit people in the name of religion. If *mantras* can give much wanted food, the world will be an easier place to live. Incidentally how is it, *yajnas* are performed to get rain only in the rainy season!

Superstition leads to roaring trade and even new technologies are developed to bolster superstitions. Factories have been set up for the express manufacture of witchcraft equipment, talisman, etc., if only to maintain the old castles, reportedly haunted by whispering ghosts. Planchettes, electromagnetic belts, organe energy boxes, divining rods, talisman, amulets, birth stones, lucky charms form a big import-export trade: Predictions and periodic forecasts find a prominent place in most periodicals. The computer horoscope is a multi-million dollar enterprise in U.S.A. Astrology as a science is taught in colleges. The fact that as many as 168 leading scientists of the world including 18 Nobel Laureates launched an outspoken attack on astrology is a proof of the magnitude of the problem.

Some superstitions are positively harmful, *e.g.*, misplaced beliefs in the possibility of doubling money; of transmutation of metals, or getting male offspring by human sacrifice, etc., often lead to tragedies.

The greatest damage done by superstition is that they deflect attention from the primary cause and lead to a defeatist attitude of helpless acceptance. They stand in the way of unearthing the root cause and undertaking adequate remedial steps.

The rate of growth of superstition is directly proportional to the gullibility of a people not alive to what science is and what science would do to enrich their lives. In a situation like this the combination of the two, *viz.,* belief in supernaturalism and in Absolutes 'constitutes a grave brake on human advance, and, by obfuscating all the major problems of existence, prevents the attainment of a full and comprehensive vision of human destiny'. However, it is known that science has been encroaching upon and diminishing the domain of superstition. But more of that later.

Science behind Superstition

There have been numerous attempts to find a scientific basis for superstitions, *e.g.,* astrology, palmistry, *nadi shastra;* the shelf life of Ganges water; the application of *tilak* or *vibhuti* on the forehead, the beneficial effects of transcendental meditation, etc.

Some of the explanations appear to be counter-productive. Tromb argues that planets and stars influence earth's electromagnetic fields which in turn mould a person's character and future. He however thinks astrologers made a grave mistake in using the date of birth instead of the date of conception. This leads us to *Pseudo-Science.*

The curious consequence of the boom in science is the growth of dubious sciences like 'dianetics', extrasensory perception (ESP), psychokinesis (PK), clairvoyance, etc. As early as 1927, David Starr Jordan, first President of Stanford, wrote a fascinating book called "The Higher Foolishness", and coined the words 'Sciosophy' meaning 'shadow wisdom' to stand for 'systematised ignorance' of pseudo-scientists : Martin Gardner in his interesting book on 'In the Name of Science (1952)' brings out the unbelievable amount of intellectual energy that has been wasted on the lost causes and the grotesque extremes to which deluded scientists can be misled and in turn mislead others.

Standen in his book 'Science is a Sacred Cow' has a swipe at scientism. Gillets' 'Bumping' theory looks at Einstein's relativity as "a moronic brain child of mental colic". Sir Isac Babson's Gravity Research Foundation has been the most useless scientific project:

Seldom before a crackpot like Lysenko received so much attention and power.

Belief in psychic phenomenon and parapsychology is as old as humanity. However, it is only of late, attempts are made to give it a scientific bias, and tested in laboratories by reputed scientists.

In his books and articles, the reputed psychologist Dr. Joseph Banks Ryne claims that ESP including telepathy and clairvoyance have been demonstrated beyond doubt by millions of people. However, only firm believers in ESP confirm his findings and not by doubting psychologists. The same is said about miracle men in India. This is it; Believe blindly, only then miracles can work! Even our scientists tell us that such men and such powers are 'inexplicable' and 'inscrutable'. As Abbas puts it—"inexplicable cannot be described in rational terms and inscrutable can't be subject to scrutiny by enquiry or reason—It is accordingly outside the realm of rational analysis". That settles the argument.

Similarly, in a fascinating volume, D. H. Rawcliffe holds up to the stern light of rational examination, hundreds of most persistent illusions and delusions of mankind like crystalgazing, automatic writing, table-turning, stigmata bycanthropy, mediumistic trances, drowsing, telepathy, ESP, PK, etc. The most apparently convincing evidence for supernatural and occult phenomena vanishes into an insubstantial tissue of trickery and delusion whenever it is closely examined.

In this field of psychic phenomenon, there appears to be two extremes in regard to scientific theories and the scientific competence of the experimentors from fully proved to totally false and in between several grey areas existing.

In spite of far from conclusive quality of the evidence, some of the intelligentia like H. G. Wells, Upton Sinclair, Aldous Huxley, Jules Romains, Arthur Koestler, etc., have accepted E.S.P. Max Freedom Long in his book, 'Science Behind Miracles' (1948) speaks about the mind's vital force over matter: *e.g.*, talking to the trees to help them grow taller! Do you remember the experiments at Annamalai University not long ago, claiming music and dancing helping the plant growth?

Arthur Koestler and Rosalind Heywood in recent issues of 'Sunday' have discussed the four categories of ESP, *viz.*, precognition, retrocognition, clairvoyance (reaction to physical events) and

telepathy (reaction to another person's mental state) and the sparks of conscsiousness that seem to exist outside the physical world. They assert dualism exists in religion and science: the 'one and many'; the conscious and the unconscious: reason versus passion; mind versus intuition; the feminine, the sacred, the mysterious against the masculine, the profane and the logical; the man's split mind with belief and disbelief, etc.

The pathology and creativity and the split between reason and emotion—Schizophysiology—are said to be the two sides of the same medal, coined by the same mint master. The 'thinking cap' governs rational thought and the archaic structure of the brain is said to govern emotional reactions. The electron is at the same time corpuscle and a wave and this dualism is fundamental to the physics and known as the principle of complementarity.

This principle of complementarity and dualism, according to these writers, may be applied to science and spirituality, socialism and spiritualism, body and mind; modern science and para-science; psychology and para-psychology; and physics and metaphysics etc.

Koestler himself admits the wings of analogy are notoriously treacherous: metaphors and parables do not make proofs! Aristotle wrote "that it was probable, the improbable would sometime take place". As Charles Chan once expressed it, "Strange events permit themselves the luxury of occurring".

Let it be freely admitted, however, that science is not in a position to interpret rationally several facts of life. For example, the mathematics of Ramanujam; Shakuntala's faster than computer mind for mathematical calculations, etc. "Science" in the words of Tagore, "is an endless striving, stretching out the hands towards perfection".

Similarly the greatest myth of scientific age is that scientists are not superstitious! Gardner in his recent article in *Science Today* (Sept. 1976), tells us, how scientists are the easiest persons to be fooled in the world. 'No ox so dumb as orthodox ox'. Most people assume that a man with brilliant mind is qualified to detect fraud. This is untrue. Unless the mind is thoroughly trained in the underground art of magic, it is easier to deceive than a child.

In India, we have our own versions of these pseudo sciences and scientists. If one tries to list the various forms of superstition existing in this country, one will find the task formidable. Judged by

the space it occupies in the weekly press particularly of late, obviously, millions of people mill around miracle men, mind readers, astrologers, palmists and others that practise dubious arts flaunting them as God-given gifts.

Indian scientists are no exception. The majority are ambivalent —a scientist in the laboratory, a superstitious addict at home. The medical doctors wear amulets; the scientists break coconuts to bribe the gods to succeed in their efforts. In the sea of tradition-bound society, steeped in superstition, science gets encapsulated without much interaction and progress is blocked.

The question now arises—how do we envisage that science and scientific attitude can counter the effects of superstition in a society?

Can Superstition survive?

The worst of the superstitious is that they are easy to make and hard to destroy.

Apart from giving an unreliable sense of security for the anxious people, does superstition serve any useful purpose? It is a big question!

If there is no struggle for survival, no fear of death, doubt, uncertainty, is there a need for superstition? Would man be superstitious, if he can govern his circumstances?

Some are firmly convinced of the efficacy of their private rituals: Some scoff at superstition and most people are somewhere in between these two attitudes. Some are apt to be shamefaced about superstition; deny in the public but practise privately. Some follow the rituals and superstitious beliefs, to respect the elders: Some practise superstition with the belief that "for every evil under the sun, there is a remedy, or there is none: if there be one, try and find out: if there be none, never mind it". (W. C. Hazlitt: *English Proverb)* 'Why start with doubts, we might as well go through with them' is yet another attitude. The sheepishness or group behaviour, not daring to be different is yet another cause to carry on with superstitions.

Today there exist two schools of thought. One school believes that constant advances in science will conquer superstition. Science is like spreading water on a dusty floor: as the water spreads, islands of dust remain but eventually close up. Others see superstition as a way of life—an example of shortcomings of human mental process. As with the advance of medicine itself has produced a new crop of diseases, scientific advances bring about new kinds of superstitions.

But again, it is for doctors to fight against disease with new knowledge and so also for educators to wean away people from the harmful superstitions.

Man—a Mixture

Man is rational and irrational : A man is different from the other man and how different, it is difficult to determine, for the lack of suitable tools and techniques. Man has mind and body giving creative and productive capacity. Science is the tool to reduce the irrational and increase the rational attitudes: to maximize the returns from his resources and to change his life styles. Scientific process is the liberation of man from irrational attitudes and free him from their interference with his production processes.

Science affects skills, attitudes and behavioural patterns to which tradition and superstition offer resistance. A strategy has to be evolved for weakening the forces impeding this change and strengthening those that favour it. Through popularisation of science, the curious, critical, questioning, sceptical and scientific attitude and rational outlook should become a way of life breaking away from the stranglehold of superstition, rituals and taboos of traditional society.

Education is intended to foster the ability of objective judgement. It is this liberal education and lingering past which determine the extent of rationalism in our lives.

Much of our science education today, at high school and even college levels is reduced to magic in the absence of facilities for experimentation. The time has come to bring science to the doors of the common people through planned experiments and practical demonstrations. For example, seeing is believing. In the long run only the correct education will provide the necessary condition.

Early historians gave first place to ancient Indians in the development of science and scientific attitudes. Imagine *Vishnu Purana* mentioning about one day of the Creator Brahma is equal to 4320 million years which is so remarkably close to the present day calculations. But where has it all gone and why has this rich tradition of science decayed ? Is it because of the over emphasis of superstition, narrow outlook and rigid rituals ?

Let us take a look at the origin of modern science.

Modern science in India developed under protection and patronage of the British and as an extension of British science.

Consequently, it never acquired the necessary revolutionary character as in the West, in the terms of challenging the prevalent outlooks and intellectual attitudes and values generated by them. Science had to fight its battle in the West, quite often in the open, as in the case of Copernican and Darwinian theories. In this conflict, spread over a long period, science emerged always victorious and established a climate of opinion based on its methods, techniques and achievements which advocated new value systems and ideals.

Science in India did not go through this process. It developed as a mere academic discipline. Prof. Bernal summed up the situation thus; "It is inevitable that in science as in other aspects of life the Indian should feel the need for national self-assertion, but this attitude is always an uneasy one. The Indian scientist must, in the first place, learn this science through English channels and be subjected to the patronizing and insulting habits of the English to their subject races. The reaction to this breeds a mixture of submissiveness and arrogance that between them inevitably affect quality of the scientific work. Indian science is noted at the same time for the originality of many of its conceptions and experimental processes, and for extreme unreliability and lack of critical faculty in carrying out the work itself". In addition it created on those who took to the study of science a peculiar ambivalence—of being scientists in the laboratory and addicts of anti-scientific attitudes, believing in ritualism, social prejudices and other common beliefs at home.

One would have expected that after India achieved her independence there would be a radical change in the attitude of people of science and that scientific temper would come into being, particularly in view of the policies adopted by the Government. The policies helped in the increase in number of institutions, scientists and expenditure on science but did not generate a scientific movement.

The reason is not far to seek. There has been a lack of confrontation between scientific knowledge and religious views not on philosophical issues but on socio-religious-ritual-superstitious attitudes. That this confrontation has not taken place may be due to the ambivalent attitude of Indian scientists themselves.

But the picture is now changing.

Today, more than ever, the scientific attitude, scientific temper and the spirit of science are catching on. One finds open discussions and debates are taking place on the question of blind beliefs and

superstition. Governments are also seized of the importance of effecting radical changes in the social structure of the country by the application of science and technology. The Prime Minister of India has been repeatedly urging the Indian scientists 'to strike beyond the narrow ritual of restricting rational thinking to laboratories and lecture halls'.

There are three noticeable steps initiated to fight superstition and inculcate the scientific attitude among the masses.

First, the 'catch 'em young' policy of introducing science as a compulsory subject in the schools. Secondly, the emphasis given to the development of rural technology and through it involve the rural folk in the application of science and technology to their problems. In this process of 'taking science to the doorsteps of the villagers' superstitions and ideas of mysticism are sought to be effectively subjugated, a rational approach is introduced and the rural people are imbibed with a spirit of inquiry and reform. Thirdly a major step has been taken in incorporating the clause about scientific temper in the revised constitution. One of the fundamental duties under 51 (A)(h) is to develop the scientific temper, humanism and the spirit of inquiry and reform.

This is a precursor and an earnest endeavour of the Government to the use of science and technology in the achievement of a welfare state. Such problems as health, family planning, social reforms, etc., where there is prevalence of widespread superstitions and irrational fears have to be tackled in a scientific manner and this can be done only by making the common man think rationally. In the words of Mrs. Gandhi, "We want scientific thinking to destroy superstition which has darkened our lives; to light the spark of adventure and bestow the gift of far-seeing wisdom and scientific attitude".

In this national task, the Indian scientist has his role. He has to face the challenge and make a determined effort to replace antiquated ideas, prejudices and superstitions with knowledge based on rational thinking. But in so doing he should not expect miracles, as science and miracles do not go together. The process is bound to be slow and he should understand the delicate mechanism that controls this pluralistic society. In this, one cannot but agree with our Prime Minister. I quote, "I think men of goodwill, men and women who are interested in science will try to enlarge the areas of light and

try to fight darkness. We have in India to adopt not only scientific methods but a more rational thinking and by this I do not mean that we should sweep overboard other values which we have but merely that those values should be used to help us to enjoy a better life and to make most of it".

That, then, is the way for science to meet superstition and other such irrational phenomena.

Article from the book 'Science, Society and the Scientific Attitude' *published by the Bangalore University in 1976.*

WHAT IS SUPERSTITION?

To believe inspite of evidence or without evidence.
To account for one mystery by another.
To believe that the world is governed by chance or caprice.
To disregard the true relation between cause and effect.
To put thought, intention and design back of nature.
To believe that mind created and controls matter.
To believe in force apart from substance, or in substance apart from force.
To believe in miracles, spells and charms, in dreams and prophecies.
To believe in the supernatural.
The foundation of superstition is ignorance, the superstructure is faith and the dome is a vain hope. Superstition is the child of ignorance and the mother of misery.
In nearly every brain is found some cloud of superstition.

— Robert Green Ingersoll

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Yogi's Prayers for Rain in Vain

H. Narasimhaiah

Bangalore is a city with a population of nearly 30 lakhs. One of the main sources of water supply to the City is from Thippagondanahalli reservoir about 20 miles from Bangalore. Owing to the failure of rains at the catchment area the level of water in the Thippagondanahalli Tank was going down causing great concern to the people and the Government.

The following news item appeared in the *Deccan Herald (DH)*, a popular English daily having the highest circulation in the State, on April 18, 1985.

> "With the rain-gods yet to show mercy, the Bangalore Water Supply and the Sewerage Board has decided to get a sage to bless the Thippagondanahalli reservoir.
>
> "The sage, Sri Shivabalayogi, is expected to pray at the reservoir in the first week of next month, Urban Development Minister A. Lakshmi Sagar said today. He made the announcement to a group of reporters who were conducted to the Hessaraghatta lake, which has turned dry and to Thippagondanahalli where the water level is 23 feet as against the full tank level of 74 feet".

I wrote the following letter to the editor of the *Deccan Herald* the same day and the letter was published on 19-4-1985:

Prayers for Rain Violate Spirit of Constitution

> I got an early morning shock today when I read a statement made by the Law Minister Lakshmi Sagar (D.H. 18-4-1985) that he would take the assistance of Shri Shiva Balayogi to get rains. He has said "The sage Shri Shiva Balayogi is expected to pray in the Thippagondanahalli reservoir in the first week of next month." This statement by the minister to say the least, is unscientific. Besides, it is flagrant violation of the spirit of the Indian Constitution.
>
> As we know ours is a secular state. The meaning of the word 'secular' as given by the Oxford English Dictionary is "Belonging to the world and its affairs as distinguished from the Church and religion; Civil, lay, temporal. Chiefly used as a negative term, with the meaning non-ecclesiastical, non-religious or non-sacred." According to the Encyclopaedia Britannica, 'secular' means "non-spiritual, having no concern with religious or spiritual matters." This clearly means that the State should be strictly neutral to religion. It implies that religion is purely a personal matter and the Government should neither encourage nor oppose any religion.

This intention of the Government in employing a sage in the hope of getting rains, violently violates another provision of the constitution. One of the important Fundamental Duties of our Constitution is "to develop scientific temper, humanism and the spirit of inquiry and reform". Hence the Law Minister Prof. A. Lakshmisagar is guilty of going against the constitution and this has resulted in his blatantly using the Government to encourage obscurantist theories.

No holyman can bring rains. Nature's laws are universal and supreme. Nobody can tamper with these laws. When Madras and its neighbourhood experienced untold human suffering due to the failure of rains about two years ago, the people there moved heaven and earth by employing all kinds of desperate measures to get rains. All the daily prayers, mass prayers and special poojas were a cry in the wilderness. *"Parjanya Japa"* did not result even in getting a single drop of rain. The rendering of *"Amrutha Varshini Raga"* by a very well known violinist Kunnaikudi Vaidyanathan was an utter failure. In short, all conceivable unscientific methods were employed with not a trace of success. The agony of the people was heart-rending. Finally, they fled to other parts of the State in search of water.

In our State also similar methods have been employed in vain in the past. But we do not learn by experience.

If sages and poojas can bring rains, we need not have areas with scanty rainfall. The shortage of rainfall can be made up by judiciously making use of such methods. Similarly, the same measures can be used to our advantage in preventing heavy rains. In short, the world need not have a Sahara desert or a Chirrapunji.

If prayers can bring rains then they can be manipulated a little to give us food also. In short, it should be possible to achieve all material prosperity and good health by careful harnessing of prayers. The role of prayer is not in the material field, but it is in the mental field.

As we know, our country is having a large number of sages, Bhagavans, Babas and other Godmen. Maximum time is used in Poojas, Yagas and other religious practices. But our so called *"Dharma Bhumi," "Punya Bhumi"* continues to be a hell for a large majority of the people.

The Law Minister's statement clearly proves that an educated superstitious person is more dangerous to the country than his uneducated counterpart. I strongly feel that the Law Minister should be prosecuted for violating the spirit of the Constitution.

This letter raised a lot of controversy. A number of letters appeared in the *Deccan Herald*. There was debate in other newspapers also. Many of these letters criticised my stand and supported the statement of the minister. A few of them supported me. Reporters of other newspapers interviewed me on the subject. Consequently, the controversy spread to those papers also.

The Government and the Bangalore Water Supply and the Sewerage Board was unnerved, a bit by this wide public controversy, on inviting the Yogi to pray for rains and put off the decision. The following news item appeared in the *Indian Express*, another news

paper having the largest net total circulation in India, on 6-5-1985.

B.W.S.S.B. puts off decision on penance for rain

Bangalore: May 5 (PTI):

"The raging controversy between the rationalists and spritualists has caused the BWSSB to postpone its decision about the day on which Sri Shivabalayogi will perform his much-awaited feat of bringing rain. Earlier, his feat was scheduled to take place during the first week of May.

Law and Urban Development Minister A. Lakshmisagar had announced last month that BWSSB was to avail of Sri Shivabalayogi's services to bring rain to the parched City.

The announcement came under immediate attack from the famous rationalist leader Dr. H. Narasimhaiah who openly questioned the yogi's spiritual powers and wrote a letter to the Chief Minister protesting against the decision and terming it an insult to all thinking people.

I once again registered a strong protest against the invitation and wrote a letter to the Chief Minister of the Karnataka State requesting him not to involve the state in such obscurantist activities. Copies of that letter were sent to all the Ministers in the Government. Nothing happened.

Meanwhile, the correspondent of the *Indian Express* interviewed both Sri Shivabalayogi and me on two successive days. The following are the extracts of the interviews published in the *Indian Express* on 22-4-1985 and 23-4-1985.

Balayogi ready for rains—and Dr. H.N.—*Express News Service:*

Bangalore—April 22: The man, the Government of Karnataka has engaged to bring rain to our parched land, is ready. "Sri Sri Sri Shivabalayogi" is all set not only to get the skies opened up through his yogic powers, he also wants to engage the rationalist war-horse Dr. H. Narasimhaiah in an open debate so as to settle the question of spiritualism versus rationalism once and for all.

The 50 year old, rotund, cheerful Swamiji who spoke to this reporter in an exhaustive interview at his sprawling ashram in J.P. Nagar flung his gauntlet: "I am challenging Narasimhaiah. Let him bring all the scientists of his ilk. Let me put an end to this nonsense. Let the country know who is genuine and who is fake".

The yogi's angry retort is a sequel to the former Bangalore University Vice-Chancellor's critical remarks on the Government's decision to use Shivabalayogi's divine powers to bring rains during first week of May. Dr. Narasimhaiah who is also a member of the State Legislative Council described the decision as "anti-secular" and "obscurantist" which went against the spirit of the Constitution.

That provoked the Yogi. He said: "I am not like Sathya Sai Baba to run away. I will give him a fitting reply when he comes here. Let him not mudsling the holymen in this country any more".

Dr. H.N. to BALAYOGI: SHOW ME—*Express News Service*

Bangalore—April 23: Dr. H. Narasimhaiah, Bangalore's celebrated rationalist,

has challenged Sri Sri Sri Shivabalayogi, Bangalore's celebrated rain yogi to demonstrate that he can bring rain at a place and time chosen by the Doctor.

This was Dr. Narasimhaiah's response to the Balayogi's challenge to him in these columns yesterday to appear for a public debate so that the people could judge who was genuine and who was fake.

Urban Development Minister Lakshmisagar caused the greatest harm to the spirit of science, Dr. H.N. said, by inviting the Yogi to bring rains. Let Shivabalayogi take eight months to prepare, he said. "But then let him bring rains at the time and place I suggest. Can he? Will he?"

The Yogi after accepting the invitation of the Government made a public announcement that he would be praying for rains at the Thippagondanahalli tank on 30th May 1985. He invited the Press, the All India Radio, and the Television personnel to accompany him. With a large retinue and paraphernalia he went to the tank to pray with all pomp and show.

The following newspaper reports which appeared in the Indian Express on 31-5-1985, the day after the public prayer, gives more details.

Tank will be Full in a Month, Yogi asserts after Prayer

Express News Service

Bangalore—May 30: The sun baked, cracked-up tankbed of Thippagondanahalli reservoir, the venue of Sri Shivabalayogi's *"Varunajapa"* (Rain Prayer) witnessed a bizarre spectacle on Thursday as the Yogi sat in meditation. And the yogi predicted after his japa that the tank will be full in a month.

Frenzied dances, blowing of conches, high-pitched bhajans and hysterical shrieks of devotees in trance turned the silent desolate tankbed into a scene of a weird and unique ritual sponsored by the Bangalore Water Supply and Sewerage Board.

The hero of the ritual, Shivabala Yogi, clad in a white cloth wrapped around his plump body, drove straight in a limousine to the dry reservoir around noon, an hour behind schedule to an uproar of welcome by his devotees.

The yogi was helped down from the jeep which brought him to the pandal erected at the receding waterline of the reservoir. He walked straight to the spot, sat down cross legged, closed his eyes in a couple of minutes and slipped into a deep meditation.

Curious villagers, little children, rural belles dressed in their best, a phalanx of Water Board Officers and devotees sat behind the yogi, who was lost to the world in his *"Dhyana"*. Except for a slight heaving stomach, the yogi sat in a rock like posture, unmindful of the devotees' hysterical dances around him.

Now and then, a devotee wiped the sweat from the yogi's body and flicked off the flies landing on his exposed hand and chest.

As the bhajans reached a crescendo, punctuated with blowing of conches, devotees rose and began wild dances.

Gyrating their bodies into frenzied spasms many danced for hours together, doing rounds of the shamiana.

A woman devotee who had worked herself into a heightened trance let out a hysterical shriek, ripped the green leaves off the pandal and chewed them vigorously. She assumed a rigid poisture and stared at space with her eyes rolled up.

The villagers watched the spectacle quietly and accepted the blessings of the devotees in trance as they went about rubbing the thumb on the foreheads of the onlookers, probably to transmit their 'ecstacies' through touch. Some of the dancers pulled out their tongues and swallowed burning camphors offered to them by some devotees.

Everything went on smoothly when suddenly a band of youngmen came briskly walking, waving black flags and shouting slogans against the Water Board and against superstitions. Police whisked them away before they could reach the site of the yogi's meditation.

The youths, who belonged to the Socialist Study Centre based in the University of Agriculture Sciences, Hebbal, appeared to have given a slip to the police who were in fact expecting them following newspaper reports. The youths posed themselves as journalists and slipped through the gate sealed off by the police.

Time rolled on. The sky was blazing some times and then the clouds were turning grey. Some of the villagers, hungry and a little bored, started walking away. A group of Australians was busy chatting about "India and its sacred yogis". They had settled down in Bangalore and were in search of meaning and truth.

It was when pressmen left the post and were looking into their wristwatches which they did every five minutes that there was a commotion at the pandal. They ran towards the yogi and the lensemen got their camaras ready. The Swamiji had already opened his eyes and broken off his meditation. It was 2.40 P.M.

What followed was a brief ritual. The yogi blessed the vibhuthi, the sacred ash, lit agarbathis and five coconuts were offered to him. He blessed them and returned them to the Water Board Officers who inturn offered them to the reservoir. A patch of the mud-coloured waters of the reservoir turned red for a while as *kumkum* floated across till it was devoured by the ripples.

Then it was time for the momentous announcement from the yogi. Journalists who were served with curd rice made from the contributions of Water Board employees were called to the guest house. The room was crammed with the devotees too who were squatted on the carpet.

"The tank will be full to the brim in a month's time" announced the Swamiji. The Water Board officials and devotees nodded their heads in satisfaction.

"I will continue praying at my ashram every day for a month", said the yogi.

Pressmen fired a battery of questions at the yogi. "Tell me, did I trouble any one during those three hours ? Am I cheating the people ? I am their servant", he said when the inevitable question on Dr. H. Narasimhaiah's tirade against him cropped up.

"There can be hundred and one MLCs and Vice-Chancellors, but there is only one yogi. Let him come to his senses and understand my experience and then challenge me. I am ready. Let him send his written question and we will sort it out in your presence", he told reporters.

The yogi fl. red up when he was reminded about the rationalist's challenge

to him to bring rains at a place chosen by him on a chosen day. "Narasimhaiah is not my lord. Let him learn to talk politely. I am not obliged to answer such a nonsensical talk".

The 30 day period was over. The situation described by the *Indian Express* was as follows:

Reservoir still Dry as Yogi gives New Excuses – *Express News Service*

Bangalore – June 29: At the fag end of the 30-day deadline fixed by Shivabalayogi, the godman engaged by the Government to produce rains in the Thippagondanahalli catchment area, the level at the reservoir has plummetted from 14.5 feet then to a precariously low 7.5 feet, but the yogi is least embarassed about it.

Instead, he has trotted out a new theory, which he propounded to ENS (Express News Service) today in unruffled abandon.

"Who gave you the impression that I have prayed all these 30 days only for Thippagondanahalli?" he blandly asked this reporter. "I actually prayed for the entire State. Is it not raining all over the State now?".

"It will rain in the Thippagondanahalli catchment area also," he stuck to his guns. "It is a question of a week or a fortnight more. Isn't it unfair to stop the rain in those parts and get the rain only here? Should we deprive the entire State of water just for the sake of T.G. Halli?"

But wasn't he the one who had confidently predicted that the T. G. Halli tank would be filled to brim in a month's time?

The Yogi had his answer ready for this question also. "See," he said, "another problem is this parched land around T.G. Halli, it blots out all the water before it can reach the reservoir", he explained with a straight face.

He insisted that whoever thought that he was praying only for water in the T.G. Halli tank had got him all wrong.

The "never-say-fail" yogi, however, brooded after a brief lapse: "May be I should have fixed a longer deadline. All these doubts nagging your mind now wouldn't have arisen at all then".

Dr. H. Narasimhaiah, the well known rationalist who threatens to be the yogi's nemesis made a joke this morning that the Yogi would meet his Waterloo in the waterless tank of T.G. Halli.

But the Yogi himself refused to concede his discomfiture.

"I will never fail," he declared, raising his feeble voice a little, "In my hectic efforts to bring rains to the parched State, I have spoiled my health. Early every morning, I am doing *dhyana* for three hours without a break, specially for T.G. Halli. Don't worry. It is bound to pour soon".

Had any evil spirit interfered with his prayers and prevented the rain gods from loosening their bounty?

"Certainly not," snapped the yogi, "Even the Water Board people asked me the same questions. The rationalists waved black flags and created all the mischief. But I am not worried about all these insinuations. I am the real rationalist, not they, because I am people. Can their black flags bring rains?"

"The Yogi is the most pitiable self-condemned man today". went on Dr. Narasimhaiah with the relish he works up generously whenever he takes digs at godmen and miracle-mongers. "He came out with some offhand assurances to a suffering people, like the politicians do. And now he is paying for it".

Dr. Narasimhaiah, however, conceded that the yogi had taken a calculated risk in setting the 30-day deadline since he very well knew that the monsoon would break out well before that any way. But even the monsoon did not co-operate with the poor man, and he made a fool of himself in the bargain".

"The yogi will go on extending his deadline till the tank gets filled up by natural causes", remarked the rationalist derisively. "After all, he has to save his face. But Sai Baba was cleverer. He never accepted my challenge, but this one did and got himself hopelessly exposed".

He, however, pointed out that the Linganamakki and other major reservoirs in the State were getting full even without the Yogi's pompous prayers. "Let him at least now stop his misadventures and devote the rest of his life to innocuous bhajans instead of getting ensnared by his own spiritual gimmicks", he counselled.

He also wanted the Government to realise at least now the great disrepute the yogi had dragged it into. He hoped that the Water Board would stop embarking on such "foolish escapades" from now on.

Thus Sri Shivabalayogi become a laughing stock in the eyes of the public. It is hoped that the yogi has learnt a bitter lesson from this historic defeat and will stop cheating people in the name of God, religion and prayers. A really spiritual person will not embark on such cheap public demonstrations.

SCIENCE AND RELIGION

Science without religion is lame, religion without science is blind.

— Albert Einstein

It was of course, a lie what you read about my religious convictions, a lie which is being systematically repeated. I do not believe in a personal God and I have never denied this but have expressed it clearly. If something is in me which can be called religious then it is the unbounded admiration for the structure of the world so far our science can reveal it.

— Albert Einstein

37

AAA Offers Statement Affirming Evolution

Across the country, evolutionism is under attack by creationists demanding "equal time" for their views in the science classroom. President Reagan is on record supporting the equal-time argument of the creationists. Already fewer than half of the public schools in the United States treat evolutionism in any detail, so even without creationist legislation evolution is not firmly entrenched in American education fifty-five years after the "Monkey Trial."

Teachers and school boards are under pressure to avoid controversy. Freedom to teach is often hostage to political pressures, and professional scientists have sometimes remained aloof from the fray, convinced the controversy was settled on the scientific evidence decades ago. But scientific societies are beginning to take the problem seriously. On December 5, 1980, for example, the American Anthropological Association overwhelmingly passed a resolution defending academic freedom and freedom of religion and offering the services of anthropologists to local schools embroiled in creation-evolution controversies. The full text follows:

Whereas evolutionary theory is the indispensable foundation for the understanding of physical anthropology and biology;

Whereas evolution is a basic component of many aspects of archaeology, cultural anthropology and linguistics;

Whereas a century of scientific reasearch has confirmed the reality of evolution as a historical process, and the concept of evolution, in all its diversity, has explained the scientifically known evidence and successfully predicted fruitful paths of further research; and

Whereas local and national campaigns by so-called scientific creationists and other antievolutionists nevertheless challenge the right of public schools to teach evolutionary theory without giving equal time to creationist and other antievolutionist expla-

nations of the origin and development of life;

Be it moved that the American Anthropological Association affirms the necessity of teaching evolution as the best scientific explanation of human and nonhuman biology and the key to understanding the origin and development of life, because the principles of evolution have been tested repeatedly and found to be valid according to scientific criteria;

The Association respects the right of people to hold diverse religious beliefs, including those which reject evolution, as matters of theology or faith but not as tenets of secular science;

Efforts to require teaching creationism in science classes, whether exclusively, as a component of science curricula or in equal-time counterpoint to evolution are not based on science but rather are attempts to promote unscientific viewpoints in the name of science without basis in the record of scientific research by generations of anthropologists and other scholars;

The subject of life origins is addressed in tremendous diversity among the world's religions, and efforts to promote particular Judeo-Christian creation accounts in public schools are ethnocentric as well as unscientific.

Be it further moved that the Association shall communicate this Motion upon passage to the public news media, to commissioners of education or equivalent officials in each of the fifty states, and to other officials and organizations deemed appropriate by the Executive Board or Executive Director.

Be it further moved that members of the Association are encouraged to promote these points of professional concern in their home communities among educators, parents, and students and in appropriate public forums beyond the boundaries of traditional professional and academic disciplines.

(*The Skeptical Inquirer*—Vol. V No. 4—Summer 1981)

To argue with a man who has renounced the use and authority of reason is like administering medicine to the dead.

— Thomas Paine

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Point of View: Drive the Pseudos Out...

John Archibald Wheeler

The following is excerpted from remarks made by physicist John Archibald Wheeler at the conclusion of a paper he presented on January 8, 1979, in Houston, at the annual meeting of the American Association for the Advancement of Science. The occasion was a symposium: "The Role of Consciousness in the Physical World." Wheeler says he prepared these comments before the symposium as an appendix to his paper, after learning that several workers in parapsychology and paraphysics, including Harold E. Puthoff, were to participate. Wheeler is an internationally renowned theoretical physicist known for his work in relativity theory. He's a former president of the American Physical Society and a former vice-president of the American Philosophical Society. After more than three decades as a professor of physics at Princeton University, he is now on the faculty of the University of Texas at Austin. Readers are invited to comment on Wheeler's views. —Ed.

I would be less than frank if I did not confess that I wanted to withdraw from this symposium when—too late—I learned that so-called extrasensory perception (SCESP) would be taken up in one of the papers. How can anyone be happy at an accompaniment of pretentious pseudoscience when he wants to discuss real issues about real observations in real science? And how can science fail to lose? That is why I, then on the AAAS Board of Directors, voted against the majority of the much larger Council at that time and against the admission of "parapsychology" as a new division of the American Association for the Advancement of Science at its meeting in Boston in 1969. That is why, with the decade of permissiveness now well past, I suggest that the Council and Board of Directors will serve science well to vote "parapsychology" out of the AAAS.

It is not the slightest part of this proposal to prevent anyone from working on "parapsychology" who wants to. Neither do I yield

to anyone in my respect for the idealism and good intentions of some I have known in that field. Nor is there in this proposal any intention to deny investigators full freedom of speech and a forum for their fribbles. There is forum enough already in a country that can afford 20,000 astrologers and only 2,000 astronomers. There is forum enough in a Parapsychological Association, a Boston Society for Psychical Research, an American Society for Psychical Research, an International Society for Psychotronic Research, and a Parapsychology Foundation. No one would think of interfering with the freedom that anyone has to publish in the *International Journal of Parapsychology,* the *Journal of the American Society for Psychical Research,* or the *Journal of Parapsychology.* Neither is it part of this proposal to interfere with the fund-raising that keeps parapsychology going in the United States to the tune of roughly $1 million to $20 million a year. Faith healers can be prosecuted, confidence men can be sent to jail, but no one would propose that parapsychologists be prevented from soliciting—even soliciting for government support. Buy why should the name "AAAS Affiliate" be allowed to give those solicitations an air of legitimacy?

Surely when so much is written about spoon-bending, parapsychology, telepathy, the Bermuda Triangle, dowsing, and when others write on "quantified etherics," bioactochronics, levitation, and occult chemistry, there must be *some* reality behind these words? Surely where there's smoke there's fire? No, where there's so much smoke there's smoke.

Every science that is a science has hundreds of hard results; but search fails to turn up a single one in "parapsychology." Would it not be fair, and for the credit of science, for "parapsychology" to be required to supply one or two or three battle-tested findings as a condition for membership in the AAAS?...

For every phenomenon that is proven to be the result of self-delusion or fraud or misunderstanding of perfectly natural everyday physics and biology, three new phenomena of "pathological science" spring up in its place. The confidence man is able to trick person after person because so often the victim is too ashamed of his gullibility or too mouselike in his "stop, thief" to warn others...

There's nothing that one can't research the hell out of. Research guided by bad judgment is a black hole for good money. No one can forbear speaking up who has seen $10,000 cozened out of a good

friend, $ 100,000 milked out of a distinguished not-for-profit research organization, and $ 1,000,000 syphoned away from American tax payers—all in the cause of "research" in pathological science.

Where there is meat there are flies. No subject more attracts the devotees of the "paranormal" than the quantum theory of measurement. To sort out what it takes to define an observation, to classify what it means to say "no elementary phenomenon is a phenomenon until it is an observed phenomenon" is difficult enough without being surrounded by the buzz of "telekinesis," "signals propagated faster than light," and "parapsychology".

Now is the time for everyone who believes in the rule of reason to speak up against pathological science and its purveyors.

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PREJUDICE AND "POST-JUDICE"

Prejudice means literally pre-judgment, the rejection of a contention out of hand, before examining the evidence. Prejudice is the result of powerful emotions, not of sound reasoning. If we wish to find out the truth of a matter we must approach the questions with as nearly open a mind as we can, and with a deep awareness of our own limitations and predispositions. On the other hand, if after carefully and openly examining the evidence, we reject the proposition, that is not prejudice. It might be called "post-judice". It is certainly a prerequisite for knowledge.

Critical and skeptical examination is the method used in everyday practical matters as well as in science. When buying a new or used car, we think it prudent to insist on written warranties, test drives and checks of particular parts. We are very careful about car dealers who are evasive on these points. Yet the practitioners of many borderline beliefs are offended when subjected to similarly close scrutiny... Where skeptical observation and discussion are suppressed, the truth is hidden.

— Carl Sagan,
Broca's Brain, Random House, 1979
Vol. IV, No. 1 Fall 1979.

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Skepticism, Closed-Mindedness and Science Fiction

Dale Beyerstein

In order to cover up the lack of evidence for the existence of paranormal phenomena, the proponents of belief in such things like to change the subject. Their strategy is: "The best defense is an offense." Instead of defending their claims against the charges made by skeptics that there is no evidence for claims of the paranormal, defenders of these beliefs often simply attack the skeptics by calling them closed-minded. Usually when believers hurl this term of abuse at nonbelievers they are just poisoning the well and have no rational argument to back up their assetion. Their assetion could be replaced by a phrase such as "Your mother wears army boots!" without changing the logical structure of their argument. The main purpose of this charge of closed-mindedness is to intimidate, to get skeptics to back off from their criticism. It has the further use of leaving the impression in the minds of those who are unfamiliar with the debates about the paranormal that only those people who refuse to look at the evidence that is manifestly there could fail to be convinced about the existence of paranormal pehnomena. Thus the impression is left among those who are unfamiliar with the alleged evidence that *if* they looked at it they would be convinced. This strategy is in fact the best one open to proponents of the paranormal: they get converts to the belief that there must be something in all this talk about the paranormal without exposing them to the weakest link in the arguments for its existence: the evidence.

In section I of this paper I shall show how charges of closed-mindedness are irrelevant to the disputes about the paranormal, in that if they apply at all to any parties in the dispute they would apply equally well to those on *both* sides of the dispute. In section II, I shall expose a typical method used by defenders of the paranormal to beg

the question about the existence of such phenomena. Given the absolute uselessness of charges of closed-mindedness in these debates, we need an explanation of the fact that they are used with such regularity. Thus in section III. I shall suggest one reason that so many believers in the paranormal think they are getting somewhere by charging skeptics with closed-mindedness.

I

Even though charges of closed-mindedness are usually brought in as a shoddy rhetorical device to prop up an otherwise hopeless argument, there may sometimes be a serious, though muddled, point lurking somewhere behind such charges. Believers in the paranormal often point to the truism that it is impossible to prove the nonexistence of something, as if this point counted in favour of their position. Of coure it doesn't; it is just as helpful for demonstrating the existence of the Easter Bunny as it is for demonstrating the existence of spooks. Unfortunately, it rarely does the skeptic any good to point this out to a believer in the paranormal; more often than not the upshot is that the believer will add the Easter Bunny to his belief system rather than drop spooks. In any event, some believers in the paranormal may be making an appeal to the impossibility of proving nonexistence when they charge skeptics with closed-mindedness. Let us reconstruct the most plausible version of such an argument:

It is impossible to prove the nonexistence of something; hence it is impossible to prove the nonexistence of paranormal phenomena. Closed-mindedness is believing in something in the absence of proof. Therefore, those people who believe that paranormal phenomena do not exist are closed-minded.

There are a lot of problems with this argument. The most serious one, however, is that, if it were valid, another argument of the same form would show that believers in the paranormal are equally closed-minded. To see this, we need to remind ourselves of what we mean by "paranormal event." A paranormal event would be one that could not have been brought about by normal causes — we can leave aside for present purposes the question of what constitutes a normal event, because it doesn't affect the present argument. The important point is that, in order to have evidence that a given event is paranormal, we must first have evidence that there were no normal events present that could have caused it. We can now see that a defender of

the paranormal who used the argument above would be hoisting himself by his own petard:

It is impossible to prove the nonexistence of something: hence it is impossible to prove the nonexistence of a normal cause for any event.

But it is necessary to prove this in order to prove that a given event is paranormal. Hence it is impossible to prove that any events are paranormal. Closed-mindedness is believing in something in the absence of proof. Therefore, those people who believe that there are paranormal events are closed-minded.

Since defenders of the paranormal see themselves as paragons of open-mindedness, they should be careful about entering into an argument that invites us to draw the conclusion that they are closed-minded. In fact there are some defenders of paranormal claims who are genuinely open-minded; but these people spend their time examining the evidence for their claims rather than engaging in pointless disputes about whether others' minds are open or closed.

II

A related version of the "Arguement from Closed-mindedness" takes the following form: The defender of paranormal beliefs expects to silence the skeptic with, "They laughed at...", where the blank can be filled in with the name of any respectable scientist (Copernicus, Galileo, Einstein, or some other). The conclusion we are expected to draw from this opening gambit is that, even though he may be "out of fashion" now, the crackpot that the believer in the paranormal is defending will be seen by future generations as a great scientist who saw the truth long before the rest of us closed-minded people did. Only open-minded people such as this particular crackpot, and of course the defender of the crackpot, can see the truth now.

Usually this argument goes wrong at the point where the paranormal defender says, "*They* laughed..." After all, who laughed at Einstein before examining and coming to understand his theories and the evidence for and against them? Only crackpots; not genuine scientists. The crackpots didn't like what they took the theory to be; and the only weapon to them was laughter, since they didn't understand enough theoretical physics to attack it on its own grounds. The scientists didn't laugh; neither did they simply believe it on faith. They were too busy making sure that they understood what Einstein

was offering for their consideration, and then devising experiments that would confirm or count against particular points in Einstein's speculations. In these endeavours, Einstein and the scientific community were working together, even though it may have appeared to nonscientists that they were at war with each other.

True, there have been some people, such as Velikovsky, who have been at war with the scientific community. But in Velikovsky's case, the war was declared by him, because he thought it was grossly unfair of the scientific community to treat him in the same way that genuine scientists *expect* to be treated. A genuine scientist expects that, if he makes a vague statement, a colleague will help him out by asking him to clarify it; he does not expect that this "genius" will be recognized *before* he presents his data. People like Velikovsky cannot have it both ways; they cannot reasonably expect to be considered genuine scientists just like everyone else in the scientific community and at the same time to be treated differently from everyone else. It is contradictory expectations such as these that identify someone as a *pseudoscientist.* Velikovsky's charges of closed-mindedness against the scientific community had about the same amount of evidence to back them up as his cosmological theories had—after all, he presented little, if any, hard data that could be tested. If he had presented such data, we would be in a position to judge how open-minded the scientific community was by seeing how they dealt with it. However, answering the question "If Velikovsky had presented hard data for his theories, would the scientific community have been open-minded about it?" is something like answering the question "If a curly tail were a leg, would a pig have five legs?"

Velikovsky's charges of closed-mindedness serve as a classic example of pseudoscientific question-begging. The unfairness or closed-mindedness of laughing at Einstein can be appreciated only if we recognize that his claims have a high probability of being true. Similarly, the unfairness of laughing at Velikovsky presupposes that his claims have a reasonable probability of being true, which was just the point in question in the Velikovsky business—or at least it ought to have been.

III

Why is it that, despite the fact that charges of closed-mindedness are red herrings in these debates, they are trotted out with such

regularity ? I think that it may have something to do with one of the persistent themes to be found in many science-fiction stories. Science fiction has as its main virtue the capacity to open our intellects to new possibilities and new ways of thinking about things. Many science-fiction stories also preach to the reader about the importance of keeping an open mind. The hero of many science-fiction works is an inventive, creative genius who must overcome not only tremendous technological problems and an unforgiving nature but also a number of twits in high places with small and closed minds. The climax of the story is often a scene where the hero either thumbs his nose at these people or bows out with their unending adulation. Great stories, and a good moral. However, if people receive only this moral, without also learning how to distinguish reasonable from unreasonable beliefs, they are ripe for the paranormal explosion. Note that I am not claiming that science-fiction writers are responsible for the paranormal explosion. It is not the job of science-fiction writers to teach people how to distinguish fact from fiction — after all, science-fiction is *fiction.* However, people who read only these kinds of stories — or worse, science fiction plus other works of fiction not clearly labeled as such, like von Däniken's, have their minds open to receive a lot of junk.

One answer to this problem is to encourage people to read good popular works on science, rather than works on the Bermuda Triangle or an auras, in addition to science fiction. Another answer would be to have more science-fiction stories that dramatize the virtues of tough-mindedness as well as open-mindedness. But yet another answer is to make sure that, when we read a science-fiction story that depicts opposition to the ideas of the hero, we don't fall into the trap of seeing straightforward opposition to ideas as closed-mindedness. All stories are told from a *point of view,* usually that of the hero. If an author gets us to believe, or to hope, that the hero is on the right track about something in the story, then it is natural for us to view his opponents as being somewhat stupid or closed-minded because they don't see this too. Perhaps the author doesn't *intend* us to view the opponents this way, but it is often a natural consequence of our adopting the point of view of the hero rather than that of the opponents. A similar kind of think often happens to proponents of the paranormal : often these people have no training in the scientific method; they have no idea of how to weigh and assess evidence

before believing a claim. They simply *adopt the point of view* of a Velikovsky or a Berlitz and see anyone who questions their hero as closed-minded.

H. G. Wells's "The Country of the Blind" is one example of a story told from a particular point of view that may beguile an incautious reader into thinking that the opponents of the hero are closed-minded, even though the evidence presented in the story does not justify this attribution. Although it is not of the science-fiction *genre*, it is worthy of comment. In this story, a man with normal vision blunders into an isolated community where many generations previously a disease had rendered the population congenitally blind. It has been so long since anyone has had vision that the vocabulary having to do with sight has been long forgotten, and all knowledge of the world that comes from sight has been lost. Of course our hero finds himself in a lot of trouble when he mentions things of which the people of this community are unaware and when he prattles on about an "extra" sense. He is, in fact, considered crazy.

One interpretation that could be drawn from this story is that if these people only would be less closed-minded and listen to this person who has a capacity that they lack (Uri Geller ? Jeane Dixon ?) they would come to understand the world more fully. Or, if one of their own people were open-minded enough to recognize the possibility of a new sense and would be willing to experiment on this stranger (Russell Targ ? Andrija Puharich ?), they could come to see the world aright.

But this story, upon closer examination, does not indicate closed-mindedness. These people do have some false beliefs, and they would be better off if they dropped them. But these beliefs are not so much the result of lacking vision as the result of mistaking inferences from the perception they have from their four working senses. Thus it doesn't require a person with an extra sense to help correct these; it requires better use of their reason.

There also are many beliefs that they do not hold but that people with vision normally do hold. But the fact that they do not immediately adopt the beliefs of the outsider with vision does not, by itself, suggest closed-mindedness. For there is a dilemma here: Either these beliefs can be had *only* by people with vision (e.g., arguably, the belief that physical objects have color); or there are ways open to the blind people to verify this information through the

four senses that they do possess. The first option corresponds to what mystic proponents of the paranormal maintain is the case with "psychics." But, on this interpretation, such information could *never* by obtained by people who lack this sense. So in what sense are these people closed-minded for doubting the existence of that for which they couldn't possibly have evidence? And what would be the sense of wishing that they be open to that which they couldn't possibly get?

The second option in the dilemma above is that this information can be had or verified by someone who lacks this extra sense. But, if so, the blind people cannot be in a position to verify the outsider's information until they discover methods of verification open to them. Before they have carried out their experiments and devised their methods, they cannot be accused of closed-mindedness for not believing the claims of the outsider. For all they can be expected to know, the outsider could have one or two fewer sense(s) than Uri Geller, but all his *chutzpah.*

In Wells's story there are shortcuts to the truth, open to some people but not to others. Does this suggest the possibility that there may be other shortcuts to the truth of which we are not yet aware? Yes, it does. But we must remember how much *less* is accomplished when someone *suggests* something than when he *provides evidence* for it. We might forget this point when we read Well's story if we allow ourselves to be beguiled by the story and forget that he is telling the story to *us,* who already know perfectly well that there is such a thing as vision. The evidence that there is vision has *already* come to us from our *experience,* not from the fictional account Wells provides. So it is absurd for us to blame the people in the story for being closed-minded. For one thing, they lack the evidence we have. For another, there is not much point in blaming fictional characters for anything. So the believers in the paranormal might profitably ask themselves two questions before drawing consolation from Well's story. First, what is *their* evidence that comes from experience prior to reading the fictional accounts contained in books on the paranormal? Second, what is the point of drawing analogies between closed-minded skeptics of the paranormal and the characters in Wells's story? Most of the former group are just as much creatures of the imagination as the latter.

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Science, Human Values and Supernatural Beliefs

H. Narasimhaiah

Life in its simplest form as a sub-microscopic entity came into existence on this planet nearly two billion years ago. In this enormous interval, life has slowly but steadily passed through various stages. Man belongs to the species called homosapiens. In this process of evolution the transformation of the quadruped into biped marks the beginning of a new era. This change resulted in the release of the two forelegs which were gradually harnessed for work. The development of language is another milestone which has brought about tremendous changes.

The primitive man knew little of the working of nature. Many a phenomenon of nature had a profound effect on him. Lightning and thunder had instilled awe and fear in him. The solar eclipses which created darkness at noon, and the lunar eclipses which cast a spell of gloom in broad moonlight, were mysterious to him. All these were considered to be supernatural. Death created an indelible impact on the mind of the early man. With the passage of time the thinking faculty slowly developed. He began looking around with interest and curiosity. Wonder dawned on him. He began questioning every event. This was the beginning of science and scientific temper.

Very few people have a clear meaning of science. The name science, too frequently and too cheaply, is not only associated but identified with its products. It is true that science makes possible useful gadgetry. But science is not gadgetry. There is a confusion of ideas with things. It is not correct to mix up science with technology. An aeroplane is not science any more than a temple is religion. The material manifestations and powers of science—however beneficial, awe inspiring, monstrous or beautiful—belong to a different category. A building is not equivalent to the architect's blueprint nor is a meal the same thing as a recipe.

T. A. Thomson in his book *Introduction to Science* says "the aim of science is to describe the impersonal facts of experience in verifiable terms as exactly as possible, as simply as possible and as com-

pletely as possible". A scientist observes phenomena, notices regularities, arrives at generalisations, deduces consequences and this process results in the formulation of laws. Thus, science arrives at truth by logical inferences and empirical observations. Experimentation and repeatability form an integral part of science. Everything has to be tested on the anvil of experiment before it can be admitted into the discipline of science. Nothing should be accepted without evidence. Everything has to be questioned and investigated into. Science does not accept the authority of any book or person however ancient the book might be, or, however great the person might be. Science has attained its authority only on account of its respect, fidelity and devotion to truth. Science is totally impersonal and not subject to likes or dislikes of the scientist. A scientist does not have any vested interest. Science searches for relations which might exist independently of the searching person.

A scientist is always humble and full of humility. He is honest and true to his conscience. He is not dogmatic. He has an open mind but of course open mind does not mean vacant mind or blank mind. And mind is like a parachute which works only when it is opened. All the conclusions of science are tentative in nature. They will be revised in the light of new data and fresh experience. This is known as the scientific attitude or scientific method of knowing truth. The true significance of science does not depend on its practical achievements, be they trivial or great, but on the technique. And this scientific method is universal and has been a very powerful means of not only understanding a problem but also trying to find a solution to it.

Science has obtained this power and prestige the hard way, fighting every inch of ground in a long and fierce battle against religious dogmas and superstitions. And this fight against obscurantism is still going on. Even though tremendous progress has been made in the field of science and technology, it is a matter of deep regret that there has not been proportionate growth in the scientific temper. Lord Todd of England, one of the truly great organic chemists of our time and chief science adviser of his Government, has said, "the past one hundred years have certainly brought about a greater change in the material aspects of civilisation than occurred in the whole previous history of mankind. And all the changes that have occurred can be attributed to science and to the modern form of technology which is the application of the scientific

method and the results of scientific research to the problem of industry, agriculture, medicine, defence and administration. As a result, science and technology now permeate almost every aspect of public and private life and they have had a profound effect on our social systems which have been slowly evolving over many centuries. The trouble is that although science and technology advance very rapidly, and it is the disparity between the rate of change in science and in social behaviour in its broadest sense that lies at the root of most of the stresses and strains in the world to-day."

Man has gone to the moon and returned triumphantly. But still there are two theories for eclipses, one for teaching in the class and the other for practising at home. The sun and the moon have not escaped from the clutches of 'Rahu' and 'Kethu'. A professor of biology teaches inside the class scientifically the theory of evolution by Darwin but believes in a totally unscientific theory in life. A physics teacher emphatically tells his students that matter cannot be created or destroyed but outside the class he believes that a watch can be created from nothing. It is not uncommon for an astronomer to believe in astrology which is totaly unscientific. For such persons, science is only a means of livelihood and not a way of life. They are highly rational in their scientific investigations but hopelessly irrational in other matters concerning life. It seems as though their thinking faculty has taken a holiday. Superstition, like weeds flourishes without care. The society is supersaturated with superstitions.

In the present day, even though science is universally encountered, the fruits of science are found every where and are also in great demand, the spirit of science is unpopular and rarely found. It is almost impossible to live in this society without the support of science and technology. But can there be alround development of the individual and the welfare of the society be achieved solely by science and technology ? Is life, only Physics, Chemistry, Mathematics, and Biology ? Does not science have its limitations ? These are some of the important questions persistently put and constantly discussed. It is also argued that science may make bulldozers but cannot train the emotions of the driver not to allow the bulldozer to roll over a crawling child. It is true that the question of moral or spiritual significance cannot be answered by science. Also, scientific statement of facts and relations cannot produce ethical directives. The solution that is sug-

gested is that science must be supplemented with religion to provide the necessary moral basis and ethical guidance.

There are many religions. They have been founded at different times in different countries. They have divided humanity into watertight compartments and have become sturdy barriers for the unity of mankind. In practice each is in conflict with the other. Nothing is so hostile to a religion as another religion. It is a rivalry and a fight between one brand of superstition and another brand of superstition. But all these conventional religions have some basic common features. They have God as their firm foundation. Besides every religion abounds in myths and miracles. Myth is an idealization of a fact and miracle a violation of nature and counterfeit of fact.

It is also claimed that every religion is revealed and inspired. Each religion has its own book of authority based on divinity. And no book of authority contains anything about the nature of the physical universe and its working which later has been found to be true by scientific investigations. Whenever religion ventured to do so it blundered as in the case, of its assertion that man was created by God in 4004 B.C. A conflict between religion and science always results in the victory of science. Faith is one of the cornerstones of any religion. Generally, religion says "Believe or be damned". Theology abhors investigation, despises thought, and denounces reason. Robert G. Ingersoll sums up the faith-based attitude of a religion as "Let reason alone. Count your beads. Ask no questions. Fall upon your knees. Shut your eyes and save your souls." But a true man when asked to believe demands evidence and the same man offers evidence before asking a person to believe. Many a time insanity is mistaken for inspiration. Theologians invade the cradle and sow the seeds of superstition. Religion tries to erect impassable tall gates on the highways of free thinking. It is futile to discuss anything with a person who has a closed mind. Thomas Paine says "To argue with a man who has renounced the use of authority of reason is like administering medicine to the dead."

All religions have created the monstrous ideas of hell and heaven. Sin is also a theological concept. There was a time when religions had a powerful sway over the minds of the people and wielded a lot of power and authority. During those days, theology generally sent the worst to heaven and the best to hell. Hypocricy wore robes and was crowned, whereas honesty wore rags and was imprisoned. Liberty was in chains.

It is very painful to recollect the atrocities perpetrated by the Church on thinkers and scientists during the Middle Ages. Gallileo, Bruno and many others were persceuted and tortured in Europe during the days of Inqusition. Religions are generally opposed to all progressive movements. The obnoxious caste system with the cruel untouchability forms part of Hinduism. This is a social evil of the worst kind. According to the caste system,accident of birth determines the social status. To elevate or condemn a person for life merely on the basis of birth is highly unscientific.

It will not be proper to condemn a religion in toto. A total rejection of a religion may mean throwing out the ethical baby with supersitious bath water. There are some positive moral attributes in theistic way of life. In the best sense of the term, religion many inspire dedication to the highest ideals. Religion has also given solace to the sick and the suffering.

In spite of some of the positive qualities, there is a fundamental conflict between science and religion. And there cannot be any reconciliation. Reason, observation and experience can be considered to be the "Holy trinity" of science which is in total disagreement with the accepted Trinity of the Church or fundamental guiding principles of any other religion. A thinking man will be very uncomfortable with any conventional type of religion. A Darwinian cannot be supernaturalist. Hence irrational religion cannot coexist with science. There is total imcompatibility. Religion cannot be a worthy partner to science which is being continuously harnessed for the welfare of mankind to create a rational society with human values. Therefore religion is to be replaced with a philosophy which is consistent with the spirit of science. Such a philosophy is humanism.

But what exactly is humanism ? Is it primarily a religious doctrine, a scientific theory or an ethical code ? It is a matter of fact that there is a considerable confusion about the meaning and implications of the term humanism. It is used in many senses. There are scientific, religious, atheistic, rational, agnostic and ethical humanists. Many existentialists, liberals, Marxists, naturalists, and religious persons claim themselves to be humanists. All of them assert that they are for man and that they wish to harness human potentialities, enhance human experience, contribute to happiness and social justice. They also proclaim that they stand for human rights and are opposed to authoritarian or totalitarian forces which dehumanise

man. All claim to profess compassion for human suffering and commitment to the unity of mankind.

Out of those different varieties of humanism the one that is selected for adoption should be consistent with the spirit of science. Fundamentally it should be different from any conventional religion. As already mentioned all such religions are God based and God inspired.

But what is God ? There is no unanimity about the concept of God. He is defined differently by different religious groups. For some, God is personal and for others, He is impersonal. It is the application of God which is more important than the mere idea of God. Whatever one does not know is generally attributed to God. Once upon a time lightning and thunder were considered to be supernatral phenomena. But after Benjamin Franklin's experiments, these phenomena are explained very satisfactorily as natural events. It is true of many other phenomena also. What was considered to be supernatural yesterday may become perfectly natural today. The moment a physician finds a cure, the priest who is an agent of God becomes irrelevant. The moment it becomes clear that prayer cannot do anything for the body, the priest shifts his ground and prays for the soul. Ignorance is equated to God. As science advances God recedes. And the area of influence of God and His size go on shrinking. Science has refined religion and the concept of God. The methodology of science is so powerful and the discoveries of science so astounding and breath-taking that many of the obscurantist and illogical religious ideas have met their Waterloo. Science has attained such a prestige that it seems as though much of what passes in religion will require the sanction of science for its recognition and survival.

God could be just an idea, a hypothesis, a guess or even a rumour. Sometimes God is defined as truth in which case God may be more comfortable in a laboratory where experiments are conducted in pursuit of truth than in a place of worship where incense is burnt, hymns sung and sermons preached. There seems to be more truth in the statement of Voltaire that man created God than in the belief that God created man. As we know according to science there is no creation. Everything is evolution.

There has been a never ending discussion and debate on the existence or otherwise of God. Science neither supports nor opposes

the existence of God. In fact science totally ignores Him in its investigation. The idea of God is never invoked either directly or indirectly in the understanding of the laws of nature.

Similarly, humanism also emphatically repudiates the role of God in any day-to-day actions or events concerning life or society. God, even if He exists has no role in human affairs. According to Einstein, the concept of God is "I believe in Spinoza's God, who reveals himself in the orderly harmony of what exists, not in the God who concerns himself with the fates and actions of human beings". Similar to the debate on God, there have been dialogues on whether mind is fundamental or matter. Can mind exist independently of matter? The following debate supposed to have taken place between two philosophers about mind and matter is interesting.

To the question "What is mind?"
the reply was "No matter"
and then "What is matter?"
the answer was "Never mind".

Humanists believe that mind is a product of matter and mind cannot have independent existence without matter. Similarly, humanists believe that there is no personal survival after death.

Humanism is not a dogma or a creed. Humanism is committed to the method of reason as the chief means of solving human problems. This conviction can be realised if men continue to have confidence in their own natural powers and abilities and the courage to use them. The central concern of humanism is for man, his growth, fulfilment and creativity here and now, this side of the grave. According to humanism man should stand on his own feet without any external divine supports or crutches and should take complete responsibilities for his actions. Man is the master of his destiny, the architect of his future. He makes his own hell and heaven; and he makes it here and now. The ideas of hell, heaven, the theory of karma, rebirth, eternal damnation and eternal salvation have lent support to social injustice and economic exploitation. Moreover they blunt the edge of dynamic thinking and weaken the will of the people from making determined efforts to change society.

Humanist temper holds that men should place their faith in man himself and his immense possibilities. Humanism is opposed to all theories of determinism, predestination and fatalism. According to humanism, human beings possess genuine freedom of choice,

or have free will. Humanism feels that it is better to be a mortal free man than an immortal slave. Humanism examines everything not in the darkness of fear but in the light of reason. Humanists do not believe in making petitions to God through prayer or rituals.

Einstein was clear and emphatic in his statement when he said "I do not believe in the God of theology who rewards good and punishes evil." Humanists believe that traditional theories which lend support to the efficacy of prayer in the sense that there is a God assumed to love and care for persons, and who answers prayers is outdated, unproved and unacceptable. Humanists believe that by the application of scientific method to nature and human life using technology judiciously, it is possible to have control over environment, conquer poverty, reduce diseases, increase the life span and alter the course of human evolution. They think that it is possible to unlock tremendous new powers which can be pressed into service of man for achieving an abundant and meaningful life.

Traditional moral codes and cults both ancient and modern have failed to serve the needs of society. After all even according to religious doctrines morality is relative. What was considered to be amoral yesterday is accepted as moral today. For not only the survival of humanity but to give a new purposeful direction bold and daring measures supported by the application of the scientific method have to be formulated. Humanism considers morality to be man made. Humanism affirms and reaffirms that the source of all moral values is human need, interest, and experience. Ethics is, social, autonomous, and situational needing no divine, religious or ideological sanction. If we do not steal or cheat or lie or commit something immoral it is not because Buddha or Krishna, Jesus or Allah had said it wrong; it is because our experience tells us it is wrong since it is inimical to the interests of the society. The golden rule "Do unto others as you would unto yourself" is as clearly a necessity to our personal well-being as it is to the harmony of social life. Morality or ethics is a code of conduct which needs no divine sanction. Humanism considers the traditional religion to be a form of escapism from intolerable conditions. If these conditions are changed there will be no need to escape. Consequently there is no need to have allies in the skies.

One important humanistic value is the preciousness of the dignity of the inividual. Humanism advocates free, independent, coura-

geous and dynamic thinking. Humanism, judges a person only by his deeds and not either by his creed or colour, race or sex. Humanism firmly believes in the separation of religion from the state.

Thus,it is evident that both science and humanism have many important features in common. Both are evolutionary and universal. Experiment and experience guide their course of evolution. Reason is their cornerstone. They are not dogmatic. They have respect for truth and honesty of facts. Both are naturalistic and not supernaturalistic.

Science and humanism should be applied to improve the quality of the individual and to usher in a rational society bereft of social injustice, exploitation, obscurnatism and economic disparities. These two philosophies must form an integral part of any pattern of education which will be the key to the progress of a society.

Even the best system of education formulated on conventional principles will not be able to change the tradition bound and stagnant society. There is a lot of truth in the statement that dogmas may flourish in a university no less than in temples. It is also said that universities polish pebbles and dim diamonds; even the polishing of pebbles is doubtful. The present pattern of education is converting an uneducated superstitious person into an educated supersitious person and an illiterate communal minded person into a literate communal minded person. And we know that an educated superstitious person and a literate communal minded person are more dangerous to the society than their uneducated counterparts. Many educationists do not have a clear conception of the objectives of education. Education should be used as a powerful means of socio-economic changes. Speaking on the role of a University, Nehru said, "a University stands for humanism, for tolerance, for reason, for the adventure of ideas and for the search for truth. It stands for the onward march of the human race towards even higher objectives. If the Universities discharge their duties adequately then it will be well with the nation and the people". The noblest occupation of a University is the pursuit of truth. There is nothing too sacred for investigation or too holy to be examined. And if a University has to fulfil its obligations to society the pattern of education shold be scientific and humanistic.

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Indian Astrologers' Squibs go damp

S. Balachandra Rao

In the January 1980 Lok Sabha elections, which was of great significance in Indian political milieu, brought Mrs. Indira Gandhi back to power. This completely belied the confident speculation of not only top leadership of the Janata Party and Lok Dal but the "predictions" of almost all top Indian astrologers.

Mr. B. V. Raman, the "doyen" among the Indian astrologers, is known for the remarkable vagueness of his political forecasts. But perhaps unwittingly he gave specific predictions in respect of the momentous Lok Sabha elections and failed miserably.

Here are a few samples of the astrological predictions made by Mr. B. V. Raman and other Indian astrologers:
(AM: Astrological Magazine).

1. "There is no indication of the Government or the Janata Party collapsing. Jupiter in the ascendant saves the situation". — *A.M.* July 1979.

(After Indira Gandhi's election debacle in 1977, the Janata Party came to power).

2. "The astrological portents point indelibly to the mid-term poll with the re-emergence of the Janata Parliamentary Party as a cohesive alternative" — *A.M.* Nov. 1979.

3. "For the Janata Party, the planetary movements during 1980 and *Dasha Bhukti* period are favourable. As such the Janata Party will emerge as the ruling party and will form the Government at the Centre".

The following are some more samples, from the *Astrological Magazine*, predicting positively that Mrs. Indira Gandhi either would not win or even if she won, she would not be the Prime Minister of India.

1. "Therefore, we conclude that Mrs. Gandhi can at best help

her party in improving its position. Improvement in her present status is practically ruled out".

2. "So it can be concluded that she will win her own seat but she will not be the Prime Minister. Her party will be the largest in the opposition".

3. "The Cancer ascendant assures well that though *she may not attain premiership* she will be again in her zenith about the year 1982".

4. "Mrs. Gandhi will never become Prime Minister during Venus *Bhukti* and she cannot succeed in the litigation and her health may also fail".

Well, here are some samples of the valuable predictions made by **Mr. B. V. Raman** himself and the skeptics of astrology are indeed grateful to him for obliging them by departing from his characteristic evasive vagueness in predictions:

1. "India has very uneasy year ahead. The Janata Government will not only last but surprisingly function much better than it has done in the past. The ex-Prime Minister's (i.e., Indira Gandhi) herculean efforts to get back to power while generating unnecessary suffering for the poor people may misfire. Her ability to influence the Government will be disconcertingly limited in effectiveness". — *A.M., Annual Number* 1979 Jan.

2. "The 3-planet combination on the 10th may not see a stable Government in Delhi" — *A.M. Annual Number,* January 1980. (Infact, on the contrary, Congress-I of Indira Gandhi won the Lok Sabha elections with a vast majority thus forming more than a stable Government.)

3. "While on the one hand this disposition indicates that no single party may be able to form the Central Government(after the mid-term poll) and whatever Government is formed may not continue to be stable" — *(Ibid).*

If one needs to relish the exemplary vagueness of Mr. B. V. Raman, here is a piece:

"Would the association of the 10th Lord with Rahu indicate the emergence of a powerful political leader from the *lower caste or minority community.* Let us wait and see" — *A.M. Annual Number,* 1979.

Of course, we waited and saw that Mrs. Gandhi — a Hindu and that too a Brahmin — far from being one from the lower caste or minority community, established hereself as the unquestioned leader of the masses. We also saw that finally Jagajivan Ram said "Ram

Ram" (good bye!) even to the party which had promised to make him the Prime Minister.

To make the astrological confusion created by B. V. Raman *et al* worse confounded, Raman summed up his astrological analysis of the poll prospects as: "... it looks as though in the coming mid-term elections, the Congress (I), the Janata and the Lok Dal will run a close race, resulting in no decisive results in favour of any single party" —*AM,* December 1979.

It is still more amusing to read the predictions of many other "top" astrologers of this country. In fact, here are some of the predictions given to show how occasionally there is an unusual unanimity in the forecasts on the same event made by the top rank astrologers – needless to mention, all these astrologers faced their Waterloo!

Pandit Rash Behari Das (alias Raghunath Panigrahi) of *Brigu Samhita* fame who is credited to have read more than a hundred thousand horoscopes over a period of more than four decades had categorically prophesied: Morarji would remain in power till 1982 when he will be succeeded by a *Jabana* (non-Hindu) – that could perhaps be George Fernandes or a Muslim leader but not Mrs. Gandhi whom he chose to describe as an "anaarya naari" (uncultured woman)!

Incidentally, Mr. Devaraj Urs, former Chief Minister of Karnataka, found favour with a famous astrologer of North Karnataka, Mr. N. K. Jogalekar. Writing in the Kannada Weekly, *Prajamata,* Mr. Jogalekar made the following amusing astrological pronouncements:

(i) No party gets a majority

(ii) The next Prime Minister will be Jagjivan Ram or Chandrashekar.

(iii) President of India will resign his Office. Morarji Desai or Nijalingappa will be the successor.

(iv) Devaraj Urs is *sure* to become Deputy Prime Miniter. Even prime ministership could be possible.

Supporters of Charan Singh need not get disappointed for atleast one astrologer favoured their ambitions here. A renowned astrologer Ambekar did cast his "astrological vote" in favour of Charan Singh by predicting in the Astrological Magazine, "If any of the three natives (Indira Gandhi, Jagjivan Ram and Charan Singh) is to become Prime Minister, it can only be Charan Singh".

If you need a still stronger dose of amusement, here is one. Analysing astrologically on the basis of the so called Prasna Jyotisha (Horary astrology), one astrologer asserted in A.M.: "The descendant chart is weak. Thus the reply is no. So it can be predicted that Mrs. Indira Gandhi can never become the Prime Minister as a result of the next Lok Sabha elections to be held in January 1980".

The overwhelming success of Mrs. Gandhi outdoing all astrological super-calculations, surely made the "descendant chart" of our astrologers very strong and their "ascendant chart" very weak. Further, no astrologer can lay claim on having predicted the most dramatic and momentous decisions of Mrs. Gandhi—National Emergency in 1975 and the elections in 1977. Nor did any astrologer predict the assassination of Mrs. Indira Gandhi in 1984.

An unprecedented unanimity of the top astrologers in their failure is a sight for planets to see, if they can, and dance in amusement.

One cannot withstand the temptation of adding to the list of the astrological "somersaults", a few more. But this time it is from B. V. Raman's illustrious successor, his daughter Mrs. Gayathridevi Vasudev:

"While these indicate her (Mrs. Indira Gandhi's) strong desire to see her progeny in her own place after she quits the scene, the astrological factors would thwart her designs at the last moment or just when she is beginning to gloat over her anticipated success in her plans".

Again, studying Rajiv Gandhi's horoscope before he became the Prime Minister of India, Gayathridevi asserts, "Since the Rajayogas are relegated to the 12th house power in this case may only imply 'near power' and dalliance with it but never 'power proper' ... The Prime Minister's (Mrs. Indira Gandhi's) wish of her progeny occupying the *gadi* may be the proverbial case of a slip between the cup and the lip" — *A.M.* February 1984.

Those that get a living by calculation of the stars by such art and other lying tricks are to be avoided.

— Buddha 'VINAYAPITAKA'

42

Science and the Mountain Peak

Isaac Asimov

Some scientists are making their peace with theology. If we listen to them, they will tell us that science has only managed to find out with a great deal of pain, suffering, storm, and strife, exactly what theologians knew all along.

A case in point is Robert Jastrow, an authentic professor of astronomy who has written a book called *God and the Astronomers.* In it and in recent articles such as "Have Astronomers Found God?" *(Reader's Digest, July 1980)* he explains that astronomers have discovered that the Universe began very suddenly and catastrophically in what is called a big bang and that they're upset about it.

The theologians, however, Jastrow says, are happy about it, because the Bible says that the Universe began very suddenly when god said, *Let there be light!*

Or, to put it in Jastrow's very own words: "For the scientist who has lived by his faith in the power of reason, the story ends like a bad dream. He has scaled the mountains of ignorance; he is about to conquer the highest peak; as he pulls himself over the final rock, he is greeted by a band of theologians who have been sitting there for centuries".

If I can read the English language, Jastrow is saying that astronomers were sure, to begin with, that the Bible was all wrong; that if the Bible said the Universe had a beginning, astronomers were sure the Universe had no beginning; that when they began to discover that the Universe did have a beginning, they were so unhappy at the Bible being right that they grew all downcast about their own discoveries.

Nothing in Common

Furthermore, if I can continue to read the English language, Jastrow is implying that since the Bible has all the answers—after all, the theologians have been sitting on the mountain peak for centu-

ries—it has been a waste of time, money, and effort for astronomers to have been peering through their little spyglasses all this time.

Perhaps Jastrow, abandoning his "faith in the power of reason" (assuming he ever had it), will now abandon his science and pore over the Bible until he finds out what a quasar is, and whether the Universe is open or closed, and where black holes might exist—questions astronomers are working with now. Why should he waste his time in observatories?

But I don't think Jastrow will, because I don't really think he believes that all the answers are in the Bible—or that he takes his own book very seriously.

In the first place, any real comparison between what the Bible says and what the astronomer thinks shows us instantly that the two have virtually nothing in common. And here are some real comparisons:

1. The Bible says that the Earth was created at the same time as the Universe was *(In the beginning, god created the heaven and the earth),* with the whole process taking six days. In fact, whereas the Earth was created at the very beginning of the creation, the Sun, Moon and stars were not created until the fourth day.

The astronomer, on the other hand, thinks the Universe was created 15 billion years ago and the Earth (together with the Sun and the Moon) was not created until a little less than five billion years ago. In other words, for ten billion years the Universe existed, full of stars, but without the Earth (or the Sun or the Moon).

2. The Bible says that in the six days of creation, the whole job was finished *(Thus the heavens and the earth were finished, and all the host of them. And on the seventh day god ended his work which he had made).*

The astronomer, on the other hand, thinks stars were being formed all through the 15 billion years since the Universe was created. In fact, stars are still being formed now, and planets and satellites along with them; and stars will continue being formed for billions of years to come.

3. The Bible says that human beings were created on the sixth day of creation, so that the Earth was empty of human intelligence for five days only.

The biologist, on the other hand, thinks (and the astronomer does not disagree) the earliest beings that were even vaguely human

didn't appear on the Earth until well over 4½ billion years after its creation.

4. The Bible doesn't say when the creation took place, but the most popular view among the theologians on that mountain peak is that creation took place in 4004 B.C.

As I've said, the astronomer thinks creation took place 15 billion years ago.

5. The Bible says the Universe was created through the word of god.

The Astronomer, on the other hand, thinks the Universe was created through the operation of the blind, unchanging laws of nature—the same laws that are in operation today.

(Notice, by the way, that in these comparisons I say "The Bible says...." but "The astronomer thinks ..." That is because theologians are always certain in their conclusions and scientists are always tentative in theirs. That, too, is an important distinction).

Theologians on Their Backs

These are enormous differences, and it would be a very unusual astronomer who could imagine finding any theologians on *his* mountain peak. Where are the theologians who said that creation took place 15 billion years ago? That the Earth was formed ten billion years later? That human beings appeared 4½ billion years later still?

Some theologians may be willing to believe this *now*, but that would only be because scientists showed them the mountain peak and carried them up there.

So what the devil is Jastrow talking about? Where is the similarity between the book of Genesis and astronomical conclusions?

One thing. One thing only.

The Bible says the Universe had a beginning. The astronomer thinks the Universe had a beginning.

That's all.

But even this similarity is not significant, because it represents a *conclusion*, and conclusions are cheap. *Anyone* can reach a conclusion—the theologian, the astronomer, the shoeshine boy down the street.

Anyone can reach a conclusion in any way—by guessing it by experiencing a gut feeling about it, by dreaming it, by copying it, by tossing a coin over it.

And no matter who reaches a conclusion and no matter how he manages to do it, he may be right provided there are a sharply limited number of possible conclusions. If eight horses are running a race, you might bet on a particular horse because the jockey is wearing your favourite colors or because the horse looks like your Aunt Hortense—and you may win just the same.

If two men are boxing for the championship and you toss a coin to pick your bet, you have one chance in two of being right—even if the fight is rigged.

How does this apply to the astronomical and theological view of the Universe? Well, we 're dealing with something in which there are a sharply limited number of conclusions—more than a two-man prizefight, but fewer than an eight-animal horserace. There are, after all, just three things that might be happening to the Universe in the long run:

A. The Universe may be unchanging, on the whole, and therefore have neither a beginning nor an end—like a fountain, which, although individual water drops rise and fall, maintains its overall shape indefinitely.

B. The Universe may be changing progressively; that is, in one direction only, and may therefore have a distinct beginning and a different end—like a person who is born, grows older (never younger) and eventually dies.

C. The Universe may be changing cyclicly, back and forth and therefore have an end that is at the beginning, so that the process starts over endlessly—like the seasons, which progress from spring, through summer, fall, and winter, but then return to spring again, so that the process starts over.

A Myth Shared by All Mythmakers

If theologians or astronomers or the shoeshine boy down the street choose from one of these three by picking one of three different cards in a hat, they will each have a one-in-three chance of being right.

It is not, however, by sheer chance that a decision is usually come to in this case. All our experience tells us that various familiar objects have a beginning and an end. A loaf of bread is baked and finally is eaten; a suit of armor is fashioned and finally rusts; a human being is born and finally dies. For that reason, alternative B seems intuitively the likely situation with respect to the Earth and the Universe.

It is not surprising, then, that people generally think there must have been a beginning to the Universe, and that even theologians think so. It is not only our Biblical theologians who think so, almost all mythmakers did. The world had a beginning in the Greek and Norse mythologies and, for that matter, in the Babylonian mythology from which the exiled Jews borrowed (with modifications) their own Genesis tale.

It is not only our theologians who are sitting on Jastrow's mountain peak, but a whole melange of primitive bards and medicine men. Now, it seems, the astronomers also suspect that alternative B is correct, that the Universe had a beginning, and they are sitting on the same mountain peak.

But conclusions don't matter. The mountain peak means nothing, since you can get there by guessing. *What counts is the route one takes to the mountain peak*

Theologians, mythmakers, legend-constructors, dreamers—all of them, *but not* scientists—derive their conclusions from intuition, or by whatever words you use to mean intuition-divine revelation, transcendental meditation, sudden enlightenment, dreams, inspiration. The words don't matter; they all mean that the conclusions is born from within one person.

But how can *you* check out a conclusion that comes from inside some other person? The results of one person's intuition cannot force another to believe. In other words, they are not compelling. Oh, yes, the charismatic dreamer can sweep people along on a tide of emotionalism. He can convert them into armies and send them out to kill—or, as we we have recently, seem to commit suicide. What's *that* got to do with the truth?

These hot-blooded attempts to find truth by intuition mean nothing to the intellectual history of humanity, except insofar as they have barred the way to an increase in our knowledge of the Universe and have succeeded in keeping us longer in the mire of ignorance.

Science—of which astronomy is one branch—is the one human endeavor that does not rely on intuition. Intuition pops up here and there on the road science travels, but the final decision on which branch to follow at each of an infinite number of intersections is based on careful observation and measurement of natural phenomena and deliberately arranged experiments. Deductions and induc-

tions are made from those observations and measurements, according to the established and universally accepted rules of reason. What's more, everything is done in the open, and nothing can be accepted unless and until those observations and measurements are repeated—independently.

Even then the acceptance of a particular "truth" is never more than tentative. It is always subject to change, since further, better, and more extensive observations and measurements may be made, and more subtly reasoned inductions and deductions can lead to more elegant and useful conclusions.

The result is that, despite controversy in the preliminary stages (and the controversy can be acrimonious, emotional, ill-advised, or all three—for scientists are human beings, too) a consensus is eventually reached. Because arguments from reason *are* compelling.

What's more, scientists accept defeat. They may do so with poor grace, but they accept it. There are examples of this all through the history of science.

What counts, then is *not* that astronomers are currently of the opinion that the Universe is changing progressively and therefore had a beginning. What counts is the long chain of careful investigation that led to the observation of red-shifts in galactic spectra (the lengthening of light waves emitted by galaxies, which shows those galaxies are moving away from us) that supports that opinion.

Questions No Theologian Can Answer

What counts is *not* that astronomers are currently of the opinion that there was once a big bang, in which an enormously concentrated "cosmic egg" that contained all the matter there is exploded with unimaginably catastrophic intensity to form the Universe. What counts is the long chain of investigation that led to the observation of the isotropic radio wave background (shortwave radio waves that reach Earth faintly, and equally, from all directions) that supports that opinion.

So when the astronomer climbs the mountain, it is irrelevant whether theologians are sitting at the peak or not, if they have not *climbed* the mountain.

As a matter of fact, the mountain peak is no mountain peak; it is merely another crossroad. The astronomer will continue to climb. Jastrow seems to think the search has come to an end and there is nothing more for astronomers to find. There occasionally have been

scientists who thought the search was all over. They are frequently quoted today, because scientists like a good laugh.

What was the cosmic egg and how did it come to explode at a particular moment in time? How did it form? Was there something before the big bang? Will the results of the explosion make themselves felt forever or will the exploding fragments at some time begin to come together again? Will the cosmic egg form again and will there be another big bang? Is it alternative C that is the true explanation of the Universe?— these are only some of the infinite number of questions that those astronomers who are not convinced it is all over are interested in. In their search they may eventually reach new and better conclusions, find new and higher mountain peaks, and no doubt find on each peak guessers and dreamers who have been sitting there for ages and will continue to sit there. And the scientists will pass by on a road that, it seems possible, will never reach an end, but will provide such interesting scenery *en route* that this, by itself gives meaning to life and mind and thought.

There is nothing to Jastrow's implication that astronomers are disturbed by the prospect of a big-bang beginning because, presumably, they hate to admit that theologians were on the mountain peak before them. This seems wrong to me.

In 1948, some astronomers (including the well-known Fred Hoyle) worked out a closely reasoned theory that made it seem that, despite the established notions of the existence of expanding Universe, there were no big bang and no beginning; that there was an eternal Universe without beginning or end. The theory was called "continuous creation".

Did astronomers in general leap gleefully behind Hoyle, to thumb their noses at the theologians? Not at all. The majority were hostile. Evidence for the big bang was stronger than for continuous creation, and as time went on, the evidence for the big bang grew stronger still. Now the theory of continuous creation is just about dead.

Astronomers didn't hesitate to follow the trail of evidence to the big bang just because it might have led them to the theologians. I don't think many of them even dreamed of it as leading to them.

The Cyclic Universe

Then why are there anti-beginning feelings among astronomers, if not because of anti-theological bigotry? Because the results are not all in yet.

Considering the amount of matter in the Universe, as far astronomers can now tell the Universe is going to expand forever. There was one big bang at the beginning and one infinite scattering at the end. That's it.

If, however, there should be about a hundred times as much matter in the universe as astronomers think there is, then gravitation will be sufficiently intense to bring a halt to the expansion, force a gradual contraction, produce another cosmic egg and another big bang, over and over. This would be like a ball bouncing high, gradually brought to a halt in its upward climb by the pull of gravity, falling faster and faster, hitting the ground, bouncing upward again, and so on, over and over. In that case, alternative C, *not alternative* B, is the truth.

Frankly, I find such a cyclic Universe more emotionally satisfying (I am human; I have emotions) than a one-shot beginning and ending. My intuition, if you like, tells me that astronomers will find that missing matter and will decide that the Universe is cyclic and that there is no beginning after all and no ending, only endless repetitions, endless bouncings, endless pulsation.

That is only my intuition, I repeat, and what makes me a scientist is that if the evidence in favour of a one-shot Universe continues to increase, I will abandon my intuition without a quiver. I have done so in other cases, as for instance when I opposed the drifting of the continents and then accepted it as more evidence came in. If, on the other hand, my intuition turns out to be correct, what happens to Jastrow's mountain peak?

No doubt Jastrow will hurriedly seek and find other Biblical quotations and quickly transport his theologians to some other mountain peak with instructions to say they have occupied it for centuries.

The scientific road is painful, hard, and slow, and to some(poor souls) the delights are not worth the effort. King Ptolemy of Egypt once asked Euclid, the mathematician, to instruct him in geometry, and Euclid undertook the taśk. Ptolemy grew restless at the slow progress, however, and finally ordered Euclid to make his proofs simpler.

"Sir", said Euclid haughtily, "there is no royal road to geometry".

But how tempting to seek the royal road when one can't face the mental perspiration of the tedious step-by-step. That's what makes

intuition seem so delightful to most people ("Oh, don't give me your arguments, I just *know*....").

It even tempts Fritjof Capra, a physicist at the University of California who has written *The Tao of Physics*. He thinks apparently, that what physicists have found out with great difficulty, Eastern sages have known all along. There's the old mountain peak.

Capra cites the Chinese notion of yin and yang, where yin represents the rational mode of thought and yang the intuitional, and believes them to be the "two sides of the same reality" or "polar areas of a single whole".

All right. No argument. Every scientist uses both reason and intuition in his attack on problems–but in the end the two are *not* equal. If intuition overwhelmingly suggests a conclusion, it still must be supported by reason, or else it is only soap-bubble speculation. If, on the other hand, the conclusion of reason goes against intuition, then reason must nevertheless be supported and intuition dismissed.

Capra seems to imply that they are equal, and he points out that modern physics, in probing into the most fundamental aspects of matter and energy, has come up with a picture in which the Universe seems to be "a continuous dancing and vibrating motion whose rhythmic patterns are determined by the molecular, atomic, and nuclear structures".

He then quotes a Taoist text to the following effect: "The stillness in stillness is not the real stillness. Only when there is stillness in movement can be spiritual rhythm appear which pervades heaven and earth". This, says Capra is "exactly the message we get from modern atomic physics".

Selected Scraps of Elliptical Obscurity

But what does the Taoist text mean? I can see that "stillness in movement" represents dynamic equilibrium and that it is the latter that is important in the Universe—but that is my *interpretation*, based on my knowledge of *science*. What did it mean to the fellow who first said it? And what other interpretations can be made of it by people who don't have my particular cast of mind?

Many Eastern sages have said many things in elliptical and obscure language, even in the originial, which suffer further in the translation. Anyone as imaginative and dedicated as Fritjof Capra (or even someone more limited, such as myself) can go through the vast

volume of Eastern sage-sayings and come up with remarks that can be interpreted to seem to match any scientific conclusion.

Capra says that all mystical traditions, East and West, agree with modern physics. Of course they do, if *one* person (Capra, for instance) undertakes to interpret selected scraps of statements from each of them in his own way.

And if modern physics changes its mind, as it has in the past when new evidence came in, what then? In that case, no doubt, one person (still Capra, perhaps) will find other scraps of mystical tradition and subject them to new interpretations and come up with another match.

But if intuition is as important to the world as reason, and if the Eastern sages are as knowledgeable about the Universe as physicists are, then why not take matters in reverse? Why not use the wisdom of the East as a key to some of the unanswered questions in physics? For instance:

What is the basic component making up subatomic particles that physicists call a quark? How many different quarks are there? What is the relationship between the intensity of their interactions and distance? Are the leptons—the lightest particles, such as the electron—made up of anything simpler? Are there any additional heavy leptons? How many: What is the relationship between quarks and leptons? And so on.

Physicists are attempting to find answers to these questions by using enormously expensive instruments to study cosmic rays and to promote high-energy particle interactions—that is, the smashing together of sub-atomic particles at enormous speeds to see what changes are produced. It would be much simpler to study Taoist texts for the answers. But if Taoist texts can only be properly understood after physicists reach the answers, then of what scientific use are the Taoist texts?

What nonsense all this supposed intuitional truth is, and how comic is the sight of the genuflections made to it by rational minds who lost their nerve.

No, it isn't really comic, it's tragic. There has been at least one other such occasion in history, when Greek secular and rational thought bowed to the mystical aspects of Chiristianity, and what followed was a Dark Age.

We can't afford another.

(*The Skeptical Inquirer*—Vol. 5, No. 2, Winter 1980-81)

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Transcendental Meditation

Collective-Meditation Claims: Case Study in Challenging

Appearing on ABC-TV's Portland, Oregon, affiliate, KATU-TV, a Mr. Robert Cox cited the "scientific technology" of Transcendental Meditation as offered through Maharishi International University.

As a guest on the local "A.M. Northwest" program, Mr. Cox claimed that through collective meditation of one-tenth of one percent of the world population (or "the square root of 1%," as he selected to enunciate), one would observe declines in crime rates, hospital admissions, and traffic fatalities. Further, according to this longtime teacher of TM, one could expect improvements in the world stock market and a subsequent easing of world tensions. The same claims are being made in widespread newspaper and magazine ads and in promotional mass mailings.

Fortunately, one of the "A.M. Northwest" hosts, Margie Boule, has chosen to examine such claims. She called Northwest Skeptics, and we provided her some background information on MIU and TM claims.

Mentioning a global experiment done in December 1983 in Fairfield, Iowa, Cox said such a demonstration showed the "principal of how this technology—the unified field—can actually enliven all the laws of nature in the environment". Commenting that all the different forces and particles in nature can be understood through one fundamental field, Cox said that "the unified field is a scientific term."

Co-host Boule played the skeptic by stating, "I hear you using the term *scientific* over and over again, and yet every time a scientific body has tried to investigate TM — the claims of levitation, for example—the science group has been refused. How can you call it scientific when there has never been any true scientific study done? Scientists have never been allowed to go in and observe the levitation, for example. Why is that?"

Rambling a bit, Cox mentioned TM studies at Harvard Medical School, Stanford, and UCLA, but agreed that "we haven't necessarily opened up to the press for observance because it would bring the whole thing down to a circus level."

Interviewer Boule then read a statement published in the *Skeptical Inquirer* in which John R. Cole, an anthropologist then at the University of Massachusetts, stated that during the summer of 1979, "before expenses, 3-5 million dollars was reaped by the TM people." "If you're going to do good," she asked Cox, "why can't you teach people how to do these things for free?"

Somewhat sheepishly, Cox replied that "everything costs money. And the TM organization is a nonprofit educational organization. And our goal is to create a state of world peace... The United States is a very wealthy country and the TM organization is by no means a wealthy organization."

He mentioned meetings within the state of Oregon with "government officials" to present them with TM technology—a claim flatly denied by a spokesman for the Oregon governor's office. Indeed, the governor's office had indicated to Northwest Skeptics three weeks *prior* to the program that they had immediately turned down any connection with the Maharishi group.

Cox stressed that TM "allows the mind to experience more and more refined states of the thinking process and develop full mental potential." But at what cost? As co-host Jim Bosley mentioned in closing, "It's about $400 now—and that's the beginning. You want to get into levitation and that's something else again—that's not cheap!" This case shows that a well-prepared host, armed through the aid of informed skeptics with some facts and critical perspectives, can change what would otherwise be a self-serving pro-pseudoscience interview into a segment that serves the public interest.

(*The Skeptical Inquirer*—Vol. 9, No. 1, Fall 1984) — John Merrell

Levity in "Levitation," Money in Meditation

As we mentioned in the Fall issue, the Australian Skeptics, newly formed section of CSICOP, has been investigating claims of Transcendental Meditation officials that they are able to teach levitation—for a fee. "I know it must sound incredible to people," said TM teacher Colin Barnes, according to one news account. "But it

happens. I fly twice a day. I flew this morning and it was really good. It is always good."

Last year Australia's top TM'er Byron Rigby, vice-chancellor of TM's Australian University, said on the Australian Broadcasting Company "Science Show" that he personally levitated twice daily in the form of hops lasting a quarter of a second. He also stated that "we open ourselves to every kind of investigation".

The Australian Skeptics took him up on his offer. In a letter to Rigby they said: "To examine your ability to control paranormally the force of gravity through exercise of levitation, we would anticipate using various scientific measurement tools which could include video-tape machines to record the phenomena, laser equipment to measure displacement, and sensitive weighing machines to measure the force of gravity."

As reported in the group's latest newsletter, *The Skeptic* (no. 2), Rigby then wrote back a disavowal of the statement. 'Levitation,' as you call it, is not the central issue in the TM Sidhi program, nor is it a claim made in the teaching of the TM Sidhi procedures... Not one of the statements or claims you attribute to me is true."

The group rechecked the tape of the ABC "Science Show" and wrote again to Rigby: "Our committee is astonished that you now disavow the claims you made in your public radio interview that you personally levitated twice per day.... Our Committee now asks you to publicly retract your organisation's claims to levitate."

No reply was immediately forthcoming.

* * * *

The Skeptic also reports the story of five former TM participants who paid more than $ 60,000 for Sidhi courses. One of them, Linda Pearce, had this to say: "It was nonsense. We were all completely taken in. He only taught people to hop around like frogs. No one ever learnt to fly. "You get into a room with springy rubber mats, then you meditate in the squatting position. Then you chant at one another and bounce up and down on the mats.

"With practice you can get several feet off the ground but there is no way you can describe it as flying."

Another former TM'er said: "I've watched hundreds of so-called flying experts, but not one could hover in the air, even for a split second. All they do is bounce and scream with contorted faces in a kind of religious fervor." — K.F.

(*The Skeptical Inquirer*—Vol. VI, No. 2, Winter 1981-82)

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Science and Humility

Pandit Jawaharlal Nehru

I am coming here today from Hirakud where I performed or helped in the opening ceremony of a very magnificent piece of work of Indian engineers, the great Hirakud Dam. This, I am told, is the longest in the world. A day before that I performed or participated in a completely different function at Nalanda, a great university centre of 1,500 years ago in Magadha, which is now Bihar. At this place, where the ruins of the university still exist, my mind went back to the days of the Buddha. I thought of his message which, apart from its religious significance, was a message of tolerance, a message against superstition, rituals and dogma. It was a message essentially in the scientific spirit. The Buddha asked no man to believe anything except what could be proved by experiment and trial. All he wanted men to do was to seek the truth and not accept anything on the word of another, even though it be of the Buddha himself. That seems to me the essence of his message, besides tolerance and compassion; and it struck me that the message, far from being out of date today, had a peculiar significance in this world of ours.

The spirit of dogma, I say with respect, has affected badly the religious quest and made both minds and practices conform too rigidly. Rigid and intolerant ideas, ideas which assert in effect that "I am in possession of the truth, the whole truth, every bit of the truth, and nobody outside the pale has it", narrow men's minds, shutting the door against a tolerant and objective approach, where men not only look up at the heavens without fear but are also prepared to look down into the pit of hell without fear. It seems to me that people in the Buddha's time were more advanced in tolerance and compassion than we are, although they were not so advanced in technology and science. While I was at Nalanda it struck me that quite apart from the religious issues, there might be something worthwhile in the pagan view of life, because it is a tolerant view of life. While it

may hold one opinion it respects the opinion of the others, and allows that there may be truth in the others' opinions, too. It looks at the universe and the mysteries of the universe and tries to fathom them in a spirit of humility. It realizes that truth is too big to be grasped at once, that however much one may know there is always much else to be known, and that it is possible that others may possess a part of that truth; and so, while the pagan view of life worships its own gods, it also does honour to unknown gods.

The scientist is supposed to be an objective seeker after truth. Science has grown because in a large measure the great scientists have sought truth in that way. But I suppose no man today, not even a scientist, can live in a world of his own, in some kind of ivory tower, cut off from what is happening. Therefore, science today has perhaps begun to cross the borders of morals and ethics. If it gets divorced completely from the realm of morality and ethics then the power it possesses may be used for evil purposes. But above all, if it ties itself to the gospel of hatred and violence, then undoubtedly it will have taken a wrong direction which will bring much peril to the world. I plead with the scientists here and elsewhere to remember that the scientific spirit is essentially one of tolerance, one of humility, one of realization that somebody else may also have a bit of the truth. Scientists should note that they do not have a monopoly of the truth; that nobody has a monopoly, no country, no people, no book. Truth is too vast to be contained in the minds of human beings, or in books, however sacred.

I remember a deputation that went to Cromwell, the English Dictator, and insisted that he should follow a certain line. Cromwell replied—and his reply is rather well known—"I beseech you gentlemen in the bowels of Christ to consider whether it is possible that you may be in the wrong".

Let us be a little humble; let us think that the truth may not perhaps be entirely with us. Let us co-operate with others; let us, even when we do not appreciate what others say, respect their views and their ways of life.

Let us go back to an ancient age in India, Asoka's period 2,300 years ago. This man who was infinitely more than an emperor has left memorials all over this great land—memorials which you can see today. Among the messages that he gave, there is one which I think we should all remember not only in this country but elsewhere. Add-

ressing his own people he said, "If you reverence your faith, while you reverence your own faith you shall reverence the faith of others. In reverencing the faith of others, you will exalt your own faith and will get your own faith honoured by others". If you apply that message of tolerance not only to religion but to the other activities of human life such as politics, economics and science, you will find that it puts things in a different context. It is a context which is not very much in evidence today in the world where differences of opinion, are not liked, where the tendency is to suppress the view, the opinion, or the way of life that is not approved of, where ultimately science itself becomes vitiated by a narrow outlook. This would have been bad enough at any time, but when we have the new weapons forged by the work of scientists hovering above us, then it becomes far more important and vital how people think today, how they react to other people's thinking, whether their minds are full of hatred and violence and intolerance, or whether they are growing in tolerance and in the appreciation of others.

(Speech at the Science Congress, Calcutta, January 14, 1957)

HUMILITY

1. If I have seen further it is by standing on the shoulders of giants.
2. I do not know what I may appear to the world; but to myself I seem to have been only like a boy playing on the seashore, and diverting myself in now and then finding a smoother pebble or a prettier shell than ordinary, whilst the great ocean of truth lay all undiscovered before me.

— Sir Isaac Newton

The question mark at the top is a universal symbol representing the spirit of inquiry and scientific temper. All progress in **every** field has been due to this process of questioning. Nothing should be accepted without questioning. The spirit of questioning is opposed to faith and blind faith.

It is remarkable that more than 2500 years ago the great Buddha stressed the importance of the spirit of inquiry as is evident from the following passage.

" Believe nothing
Merely because you have been told it
Or because it is traditional
Or because you yourself have imagined it
Do not believe what your teacher tells you
merely out of respect for the teacher
But whatever, after due examination and analysis
You find to be conducive to the good,
the benefit
The welfare of all beings
that doctrine believe and cling to
and take it as your guide".....

— *The Buddha*